A REVIEW ON FRUIT SEGREGATION USING DEEPLEARNING

Dr. (Mrs.) Archana V. Dehankar, Darshana Kohad, Hemanshu Dharmik, Shravani Chambhare, Kaustubh Dhoke, Janvi Hingwe
Department of Computer Technology Priyadarshini College of Engineering, Nagpur, India

ABSTRACT

Automation, as a fundamental property in the agricultural sector, raises and improves the standard and expands the efficiency of manufacturing goods. The improved sorting of goods had an impact on the quality evaluation. Higher output was needed as technology advanced to meet human needs and industry demands. Fruits Segregation using Deep Learning uses image processing to detect and differentiate between various types of fruits. This paper proposes an OpenCV, Python and Convolution Neural Network (CNN) to complete the segregation of three major fruits: apple, orange, and banana. Also, this paper discusses literature reviews of various related works on this topic. This paper presents a comparison of different methods proposed by researchers for classifying fruits.

Keywords: *Deep Learning, Image Processing, CNN,Sequential Model, Computer Vision.*

I. Introduction

70% of India's population relies on agriculture. Agriculture is extremely beneficial to the expansion of the economy by providing food and raw materials to non-agricultural sectors. Agriculture needs a lot of manpower. Farmers must devote a significant amount of time to manual sorting and examining fruits from harvest through the growth period. Manual sorting does not always produce satisfactory results, so efficient farming techniques are required. Used to get better yield and growth with less human effort. A lot of recent research has been done on the computer's ability to reduce processing time and provide precise results. Digital image processing as a computer-based technique has been widely used in agriculture for segregation purposes. Image processing is a type of signal processing where an image is given as an input, such as photographs or frames of video, and the output obtained will be image parameters or an image.

Also, India's population is rapidly increasing. The quantity of food has been the most affected by population growth. As the population grows, so does the demand for high-quality food. In this proposal, we have been discussing fruit segregation. For the development of accurate and fast segregation of fruit, the grading process takes place. It is done based on the overall quality features of the fruit, like shape, colour, and size. Recent developments in automatic vision-based technology.

Use of this technology is increasing in agriculture and the fruit industry. An automatic fruit segregation system will be used for the sorting and grading of various fruits.

II. Literature Review

Dhameshwari Sahu and Ravindra M. P. (2017) [1] use computer vision applications and image processing for identification and consistency assessment in agriculture applications. Fruit defect detection and identification is a challenging task to accomplish at near-human levels of detection. The authors create a structure that is beneficial to the seller and can be used to apply computer vision to the automated separation of fruits from various types of fruits. Using digital image processing, the authors created a method to detect defects and determine the ripeness of fruits based on their size and shape.

Bhargava and Bansal (2018) [2] conducted their most recent research on fruit and vegetable quality assessments using a monitoring process that includes pre-processing, categorization, and fruit and vegetable extraction based on various compositions and classifications. The paper also commented on a comparison of various ideas presented by analysts for quality assurance, including ultrasound, infrared imaging, and tomographic imaging. The test result was drawn to infer that the ideas proposed could be used as a separate colour space to extract the colour feature and that the system generated by them is free of bias.

Aaron Don M. Africa, Anna Rovia V. Tabala, and Mharela Angela A. Tan (2020) [3] concluded in their journal that, prior to their release in the market, ripe fruits are classified

and graded for quality by humans. Recent studies, however, indicate that using physical characteristics like shape, colour, and texture as the only criteria for estimating quality could be prone to human error since these factors require consistency during the examination. Several studies have proposed and presented different methods to detect and classify fruits more accurately. The authors were able to enumerate some of the most widely used and most effective methods, including deep learning, image illumination, faster-CNN, and the use of a gas chromatograph for the detection of ethylene gas.

Anand Upadhyay, Sunny Singh and Shona Kanojia in 2020 & 2023 [4][5] use Convolution Neural Network Based Segregation of Ripe and Raw Bananas. The paper commented that this technique reduces the efforts of humans and can give up to 90% accuracy. This study used a convolutional neural network (CNN) to classify bananas as raw or ripe without the use of human labor. Bananas were classified by their colour appearance in the CNN classification and not only this, but it can also be used to classify numerous other types of fruits and vegetables.

Venkat Ghodke, Suresh Pungaiah, Mohamed Shamout, Allwyn Sundarraj, Maidul Islam Judder and S. Vijaprasath (2022) [6] developed a system for quality rating and product classification to eliminate the wastage of fruits due to the transportation of overripe or already rotten fruits during the logistics. Firstly, start the process by including the image dataset, and the first step is preprocessing. The next step is segmenting the images from the stage of pre-processing filtered images, which helps resolve the images. Extracting the features based on the image weights and evaluating them for classification. Also using the training and testing images for classification, it includes separating or relating color, texture, shape, and faults. Finally, classification using the LSVR process improves image quality and assists the industry in separating products. The use of images in the automated packaging process improves the quality of the results in more ways than ever before.

Nagnath Aherwadi and Usha Mittal (2022) [7], published a paper. The paper shows well-known techniques of image processing, machine learning, and deep learning technologies that can be used in the maturity classification, quality identification, and shelf-life identification of fruit. Different algorithms and techniques used for all the above problems are discussed in that paper. First Fruit is identified, and further maturity classification is performed based on fruit maturity status in order to determine the quality and shelf life of fruits.

Norhidayah Mohd Rozi and colleagues (2021) [8] investigated the Development of Fruits Artificial Intelligence Segregation. Using a hardware-based system and artificial intelligence, they showed how fruits can be segregated without the need for human involvement. To separate the fruits, the system used a Raspberry Pi and a camera. Their system's accuracy was up to 97%. Their system can apply the liveness discovery techniques to the fruit segregation system using software, in which the sorting discovery is performed by the shape and colour of the fruit.

Goutam Kambale and Dr. Nitin Bigli (2017) [9] conducted their survey on Crop Disease Identification and Classification Using Pattern Recognition and Digital Image Processing Techniques. Their system requires a high quality image to be captured using a digital camera, processing that image using image processing software, and then identifying or classifying the disease using pattern recognition methodology to help farmers recognise the disease more accurately, which cannot be done with our naked eyes.

Aafreen Kazi and Siba Prasad Panda (2022) [10] did research on determining the freshness of fruits in the food industry by image classification. Their system was developed based on transfer learning methodologies. Rather than enforcing the traditional CNN architecture, their system attempts to investigate the capability of transfer learning with respect to CNN models in image classification of fruits. Based on their test scores, the system attempted to evaluate the best performing model on image data consisting of six different types of fruits. The results suggest that the freshness of fruits could be determined with high accurateness by using traditional and residual convolutional neural networks.

III. Methodology

Software Tools

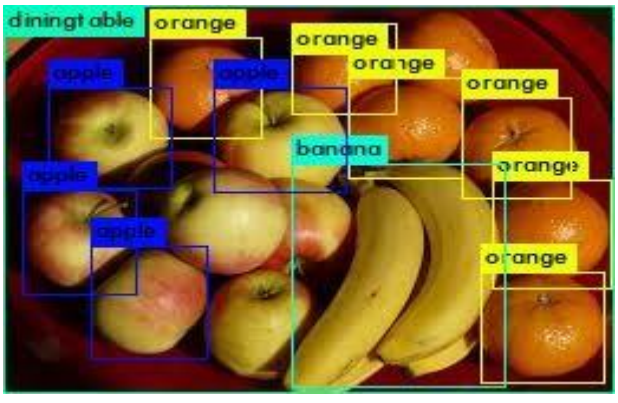
The CCN techniques applied in this work use several two main software: Phyton 3.8 and OpenCV.

Python 3.8

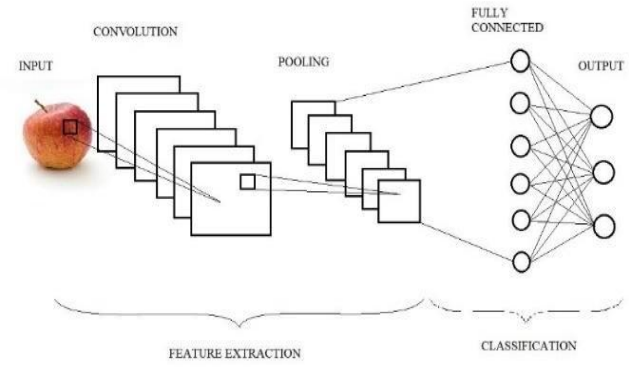
Python is a flexible language for programming that is easy to understand. These have successful high-level knowledge structures anda simple but efficient approach to object-oriented programming. For all major platforms from the Python Web site, a python interpreter and the full standard library are freely available and can be freely distributed in source or binary form. The same section also provides distributions and pointers to some free Python third-party modules, programs and tools, and additional documentation.

OpenCV

The Open-Source Computer Vision Library (OpenCV) is an open-source computer vision and machine learning software library. Over 2500 optimized algorithms in the libraryinclude a broad set of computer vision and machine learning algorithms, both classic and state-of-the-art. These algorithms can be used to identify and recognize faces, identify objects, classify human activity in videos, monitor camera movements, track moving objects, extract 3D object models, generate 3D point clouds from stereo cameras, stitch images together to create a high-resolution image of the entire scene, check for an identical image from an image database, and delete red eyes from a flash image.



Convolution Neural Network



Deep learning algorithm used for image classification was CNN. CNN is composed of several convolutional, pooling layer and a general neural network layer which is called as a fully connected layer, shows a good performance for the input data of 2-dimension structure such as image. Convolutional layer makes it possible to extract features without being affected by the size or position of the target on the input image through the convolution operation. Pooling layer reduces the feature through the subsampling in the process to reduce the data increased by the convolutional progress. The convolutional and pooling operation is being repeated, and the feature extraction performance is determined according to this. As the features are obtained through convolutional and pooling layers, the classification task is performed in the final full connected layer (LeCun et al., 2010). It was used for the GPU possible parallel processing utilizing GPGPU (General-Purpose computing on Graphics Processing Units) concept to train fast, because CNN algorithm requires a lot of computation.

IV. Conclusion

In this paper, A review on Fruit Segregation UsingDeep Learning, Deep learning algorithms best techniques for fruit detection, maturity classification and quality assessment depend on the datasets used for that experiment. [5] CNN model achieved 79.49% accuracy whereas SVM achieved 69% accuracy, so in this case, the Deep learning technique is best. [20] Again here CNN got the highest accuracy 91.6% as compared to an image processing technique accuracy of 60%. So, the working accuracy totally depends on the dataset and techniques used for detection and classificationwith quality assessment of fruits.

V. Future Research

It is recommended to do more research on this paper and determine what can be improved. In the future, we can implement this software-based system on a larger scale by adding it to the mega factories, which require the segregation of fruits and quality to be maintained for their raw products,such as fruits. We can do more than just fruit segregation if the perfect set of datasets is made available, or we can build a perfect set of data by capturing high-quality images. In the near future, we can also implement our software with a roboticarm to remove unripe or overripe fruit from conveyor belts used in the packaging industry, which will eliminate the need for humans to manually remove it before it reaches the final packaging point.

References

1. D. Sahu and R. M. Potdar, "Dameshwari Sahu, Ravindra Manohar Potdar. Defect Identification and Maturity Detection of Mango Fruits Using Image Analysis," American Journal of Artificial Intelligence, vol. 1, no. 1, (Jul. 2017) pp. 5–14.
2. Anuja Bhargava, Atul Bansal & Vishal Goyal. "Machine Learning Based Detection and Sorting of Multiple Vegetables and Fruits," Food Anal. Methods 15, 228–242 (2022) Springer (Aug. 2021)
3. Aaron Don M, Africa, Anna Rovia V. Tabala, and Mharela Angela A Tan. Specialized Philippine Enterprise References of Experts and Scientists, Open Publication 2020.
4. Anand Upadhyay, Sunny Singh and Shona Kanojia. "Design of Fruit Segregation and Packaging Machine," 2020 International Conference on Computational Performance Evaluation (ComPE) North-Eastern Hill University, Shillong, Meghalaya, India. Jul 2-4,2020.
5. Anand Upadhyay, Sunny Singh and Shona Kanojia. "Segregation of Ripe and Raw Bananas Using Convolution Neural Network," International Conference on Machine Learning and Data Engineering Procedia Computer Science 218 (2023) 461–468.
6. Venkat Ghodke, Suresh Pungaiah, Mohamed Shamout, Allwyn Sundarraj, Maidul Islam Judder,
7. S. Vijaprasath. "Machine Learning for Auto Segregation of Fruits Classification Based Logistic Support Vector Regression," 2022 2nd International Conference on Technology Advancements in Computational Sciences (ICTACS).
8. Nagnath Aherwadi and Usha Mittal. "Fruit Quality Identification Using Image Processing, Machine Learning, And Deep Learning: A Review," Advances and Applications in Mathematical Sciences Volume 21, Issue 5, March 2022, Pages 2645-2660.
9. Norhidayah Mohd Rozi1, Razaidi Hussin, Muammar Mohamad Isa, Syed Muhammad Mamduh Syed Zakaria, Afzan Kamaruddin, Rizalafande Che Ismail, Mohd Nazrin Md Isa and Siti Zarina Md Naziri. "Development of Fruits Artificial Intelligence Segregation," International Journal of Nanoelectronics and Materials Volume 14 (Special Issue) December 2021 [245-252].
10. Goutam Kambale & Dr. Nitin Bigli. "A SurveyPaper on Crop Disease Identification and Classification Using Pattern Recognition and Digital Image Processing Techniques National Conference On Advances In Computational," IOSR Journal of Computer Engineering (IOSR- JCE) May 2017 e-ISSN: 2278-0661,p-ISSN: 2278-8727
11. Aafreen Kazi & Siba Prasad Panda. "Determining the freshness of fruits in the food industry by image classification using transfer learning," Multimed Tools Appl 81, 7611–7624 (2022).

BLUETOOTH CONTROLLED NERF GUN

Ritik Motwani[1] Saurabh Kandrikar[2] Sayali Kapse[3] Devendra Meshram[4] Rajendra B. Khule[5]
[1,2,3,4]Students [5]Assistant Professor Department of Electronics Engineering
K.D.K College of Engineering, Nagpur, India

ABSTRACT

Android applications combined with Bluetooth technology are an inseparable pair at this time specially for controlling a robot. A sophisticated military robot is a robot that is needed by the military/police because it can be deployed to the battlefield or the eradication of terrorism that canbe controlled remotely. This system is needed to reduce the remaining casualties from the army, and this Bluetooth Controlled Nerf Gun system can also be operated at any time with more numbers than regular soldiers and with minimal operator needs. In this, we propose a prototype of a Bluetooth controlled nerf gun with object detection and controlling using Android for simulation of shooting the enemy target. Nowadays, with the development of technology, several robots with very special integrated systems are particularly employed for such risky jobs to do the work diligently and precisely. The development of intelligent robots for military purposes increasing every year. The military inventory now comprises ground robot's UAV's (Unmanned Aerial Vehicle).

Keywords: *Bluetooth Technology, Intelligent Robots, UAV's (Unmanned Aerial Vehicle), Personal Area Network (PAN).*

Introduction

An armoured vehicle is known as the starting point of today's modern land weapons either mechanically or electronically. Most of advanced systems and an active protection system is first implemented in the armorer vehicle as the major protection for the soldiers during battle. The improvement in the current technologies had increase the performance of the armoured vehicle especially in the stability and safety system of the armoured
vehicle. One of the major systems which have improved in the armoured vehicle is the gun turret weapon system. A gun turret is the rotating weapon platform mounted on top of the armoured vehicle and land like the bunkers. It is the mechanism for the projectile-firing weaponand mechanism to enable the weapon to be aimed and fired in many directions during battle. The gun turret provides protection to both soldiers and weapons within the armoured vehicle against battle damage, weather conditions and general environmental caused by the operating conditions of the turret gun. The gun stabilization concept in terms of variation in elevation axis. In the upper view, the orientation of the gun is kept horizontal relative to the earth the deviation from the target was translational which is independent of the target distance.However, in the lower view, the orientation of the gun is fixed horizontally relative to the gun and both angular and translational errors occurred. The rotational error results in very large aiming error, which increases with increasing target distance and road surface conditions.
Gun stabilization concept in terms of variation intraverse axis. Upper image shows the gun is fixed on gun turret while the gun fixed to the vehicle or on the land axis. For both cases, the errors obtained with the stabilized gun are only due to the translational movements of the vehicle and very low compared to the errors resulted in the non-stabilized gun case. Hence, anactive system is required to counter back the errors due to the translational movements of the armed vehicle.

Methodology

- The Bluetooth module that we used is the Bluetooth HC-05 which, as the name suggests, communicates with the microcontroller using the Bluetooth serial protocol. The only or computer app that Bluetooth developed.
- As mentioned previously, the purpose of the Bluetooth module is to allow for untethered control of the tank using a computer or phone. The Bluetooth HC-05 Friendmodule interacts specifically with the app developed. The interface inside the app to control the nerf gun.
- Information moves through the system as follows: A button is pressed in the phone

app which sends a code over Bluetooth to the Bluetooth module. The module then relays the information to the microcontroller.

- When a button is pressed in the app interface, the string of characters that is sent from the device to the Bluetooth module is always prefixed by a character and suffixed by either. The remaining elements of the code specify what button was pressed.
- Now that the Bluetooth module has the code, there still remains the issue of relaying it to the microcontroller and acting upon it. For this, we created another thread which uses DMA (Direct Memory Access) to get data from the UART channel.
- The mechanism for shooting the dart is a partially deconstructed motorized Nerf weapon. We sawed off the back half to gain easy access to the chamber where darts are inserted and the wires are connected to the motors. Originally, these wires were hooked up to a switch activated by the trigger which electrically connected the wires when pressed, causing the motors to turn on.
- For powering the robot, we had three separate battery systems included: a 9V battery for the microcontroller; two 18610 lithium-ion batteries for the tank motors; and six AA batteries for the Nerf gun's barrel motors. When powering the PIC32 with the 9V battery, we used a 9V to DC power adapter that plugged into the onboard power connector.

Block Diagram

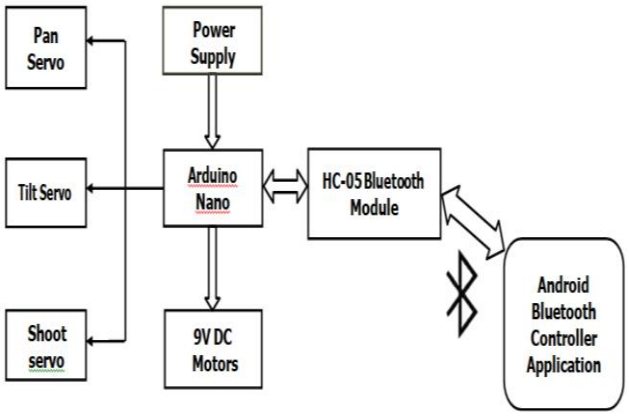
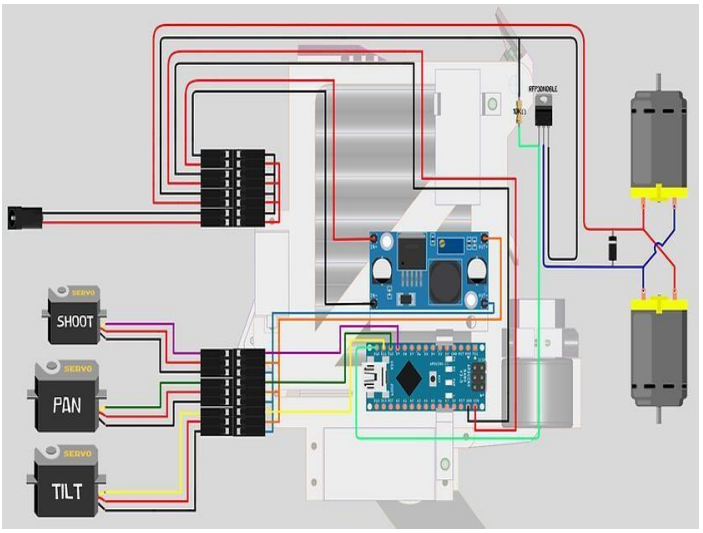
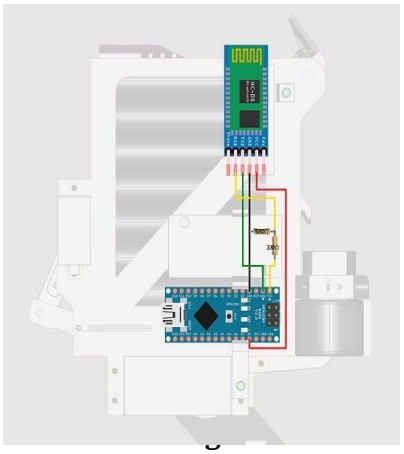


Fig. 1 Block diagram of overall system





Conclusion

The concept of the gun-turret system developed in this study using Lagrange Theory is used to investigate the performance of the target tracking and locking system of a gun using PID controller. Based on the results discussed earlier, the 2 DOF's gun turret is able to follow the desired trajectory angle and lock to the desired angle. The maximum required motor torque to achieve this for both the bearing and elevation motor is 125nm. It was also shown that a fixed PID parameters were able to perform target tracking for 2 DOF gun turret in bearing elevationangle with minor deviation. In order to make the mobile robot, computers and related equipment more friendly, there is a strong need for a better way for all the electronic devices to communicate with each other. Bluetooth is a new short-range wireless technology designed to enable wireless communication between diverse devices. It is gaining increasing popularity and acceptance in the world today [12]. Bluetooth's versatility

enables its use in a wide range of mobile digital devices. Based on energy consumption characteristics of MSP430F149, the system energy consumption has been reduced to the maximum extent. It is proved that the "soft and rigid" location method is practical and available through experiments. Above all, this technique makes it possible to design home and industry mobile robots the future and it will certainly get an optimistic market.

References

1. E. Shi, Y. Huang, and W. Shi, “Predictive Controlling of Wheeled Mobile Robot Tracking”, Mechanics Science and Technology, vol. 23, issue 10, pp.1234-1237, Oct 2004.
2. W. Ge, "The Application Research of the Mobile Robot Teleoperation System Based on the Virtual Reality Technology," Tianjin University Doctor's degree Thesis, Jun 2004, pp. 1-8.
3. N. Ersala and D. C. Yen, “Bluetooth wireless mobile computing, eBooks”, Computer Standards & Interfaces, vol. 24, pp. 189-191, 2002.
4. D. Normile, "Real-world Bluetooth," Global design news, Japan, Jul 2002.
5. N. Erasala and D. C. Yen, "Bluetooth technology: a strategic analysis of its role in global 3G wireless communication era," Computer Standards & Interfaces, vol. 24, pp.193-206, 2002.
6. W. Keigo, I. Kiyotaka, and H. Fuhua, "Development of an omnidirectional mobile robot with active dual-wheel casters", Advanced Robotics, vol. 13, issue 3, pp. 239-240, 1999.
7. K.N. Krishnanand and G. Debasish, "Formations of minimalist mobile robots using local-templates and spatially distributed interactions”, Robotics & Autonomous Systems, vol. 53, issue 3/4, pp.194-213, Dec 2005.
8. F. Michaud, et al, "Autonomous Spherical Mobile Robot for Child-Development Studies," IEEE Transactions on Systems, Man & Cybernetics. Part A, vol. 35, issue 4,pp. 471-480, Jul 2005.
9. E. F. Fukushima, N. Kitamura, and S. Hirose, "Development of tethered autonomous mobile robot systems for field works," Advanced Robotics, vol. 15, issue 4, pp. 481- 496, 2001.
10. H. Hu and M. Brady, "A parallel processing architecture for sensor-based control of intelligent mobile robots," The International Journal of Robotics and Autonomous Systems, vol. 17, no. 4, pp. 235-257, 1996.
11. Y. Zhou, Y. Ren, and Y. Wang, "Application in Bluetooth products of the MSP430 low energy consumption characteristics," Electric Technology and Application, no. 12,pp. 12-15, 2003.
12. Pallard and Cedric, "Bluetooth Technology Integration: Which Path Should You Choose?" Wireless Systems Design, vol. 6, issue 1, pp. 53-56, Jan 2001.
13. Ahmadian, Mehdi, and James C. Poynor. "An evaluation of magneto rheological dampers for controlling gun recoil dynamics." Shock and Vibration8, no. 3-4 (2001): 147-155.
14. Ahmadian, Mehdi, Randall J. Appleton, and James A. Norris. "Designing magneto-rheological dampers in a fire out-of-battery recoil system." Magnetics, IEEE Transactions on 39, no. 1 (2003): 480-485.
15. Coleman, Norman, Ken Lam, and Ching-Fang Lin. "Method and system for automatic pointing stabilization and aiming control device." U.S. Patent 7,239,976, issued July 3,2007.
16. Dos Santos Gomes, Marcio, and Armando Morado Ferreira. "GUN- TURRET MODELLING AND CONTROL." (2005).
17. Friedland, Bernard. Control system design: an introduction to state-space methods. Courier Dover Publications, 2012.
18. Galal, Myo, N. G. Mikhail, and G. Elnashar. "Fuzzy logic Controller Design for gun- turret system." In 13th International Conference on AEROSPACE SCIENCES & AVIATION TECHNOLOGY, ASAT, vol. 13. 2009.
19. Gao, Qiang, Jilin Chen, Li Wang, Shiqing

Xu, and Yuanlong Hou. "Multiobjective optimization design of a fractional order PID controller for a gun control system." TheScientific World Journal 2013 (2013).

20. Gourley, R., Scott, "Turret Gun Stabilisation or the Art of Moving to Keep Steady" Armada Magazine, Reader Service 004, 2004, pp 48-56.
21. Gümüúay, Özdemir. "Intelligent Stabilization Control Of Turret Subsystems Under Disturbances From Unstructured Terrain." Phd Diss., Middle East Technical University, 2006.
22. Kumar, Gautam, Pradeep Y. Tiwari, Vincent Marcopoli, and Mayuresh V. Kothare. "A study of a gun-turret assembly in an armored tank using model predictive control." In American Control Conference, 2009. ACC'09., pp. 4848-4853. IEEE, 2009.

CLOUD BASED SMART WATER DAM MANAGEMENT SYSTEM USING LORA TECHNOLOGY

Vrushali Mohite[1], Sujit Khangar[2], Eshwar Pudke[3], Payal Mundharikar[4] and Prof. V.N. Mahawadiwar[5]

Department of Electronics & Telecommunication Engineering, RTMNU University, NagpurCity, MS
vrushalimohite223@gmail.com

ABSTRACT

Water scarcity is a major issue faced by many countries around the world. To combat the wastage of water, a water level monitoring system has been developed. This system automatically detects and indicates the water level in reservoirs, overhead tanks, and other storage containers, and transmits this information wirelessly to registered users. In order to save energy and improve efficiency, people may want to automate their tasks. Ultrasonic sensors, which use high-frequency ultrasonic waves to detect the level of liquids or solids, are often used to monitor water levels. These sensors are mounted at the top of a tank and transmit waves, measuring the time it takes for the return signal to be received by the sensor. The proposed project aims to use a webserver for the internal analysis of water dams, household/society water tanks, and municipality water towers. Checking the water level in these containers can be a troublesome and time-consuming task. Furthermore, the project seeks to address the issue of water wastage. Often, people forget to turn off the motor when the tank is full, resulting in water being wasted. The water level monitoring system can be used to monitor water levels and consumption, thereby reducing water wastage. To detect and indicate the water level in an overhead tank or any other water container, a Water Level Indicator is used. In this paper, we describe the design of a water level sensor device using NodeMcu. The device uses an ultrasonic sensor to generate ultrasonic waves, a water sensor to detect the water level, LEDs to indicate the water level, and a PC to observe the water levels. This circuit is highly efficient and can be used for monitoring the levels of any liquid in any application.

Keywords: *IoT, LoRa SX1278, UITRASONIC SENSOR, ESP8266.*

1. Introduction

The Earth's total water resources amount to approximately 1.4 billion cubic km, with 95% of it being located in the oceans, rendering it unsuitable for human consumption. Studies indicate that by 2025, more than 50% of the world's population could face water shortages, making it essential to preserve fresh water resources. Monitoring technology has been designed to address this issue, with a focus on disaster management and air pollution.

The monitoring of water levels in overhead dams can be a challenging task that requires manual checking or allowing water to overflow from the top. Electronic water level indicators, which use dipped electrodes or float switches, have been developed to solve this problem. However, the use of these electrodes can lead to corrosion, making it difficult for the system to function properly in the long run. To address this issue, an Ultrasonic module with Arduino and Flood Detection System has been proposed as a contactless approach to measuring water levels.

Electric water controllers were initially developed in the early 1990s to track water levels in chemical industries and agricultural and irrigation projects, but their initial design was imperfect. Solid-state electronics, combined with integrated electronics, offer better performance, low cost, and efficient installation. Water level sensor indicators can manage the flow of water in a variety of applications, such as water tubs, pumps, and pools.

The Earth's total water volume is approximately 1.4 billion cubic km, which would cover the planet with a layer of 3 km. However, 95% of this water is in the oceans and not fit for human consumption. Experts have predicted that more than 50% of the global population will face water scarcity by 2025. In India, for instance, a person consumes an average of 135 liters of water daily, and this consumption is expected to increase by 40% in the coming years. Hence, there is a pressing need to preserve freshwater resources. While some studies have focused on monitoring technology for disaster management and air pollution, electronic water level indicators can be a viable solution for monitoring water levels. However, traditional systems that use dipped electrodes or float switches may not be

reliable in the long run, unlike the contactless ultrasonic modules with Nodemcu and Flood Alert System used in this project. Originally developed in the 1990s for tracking liquid levels in industries and irrigation projects, electric water controllers have evolved with solid-state and integrated electronics, offering low-cost and efficient solutions with easy installation. These water level sensors can optimize the performance of water systems in various applications, such as water tubs, pumps, and pools. Flooding can increase the transmission of water and vector-borne diseases, posing risks to public health and water sources. Contamination of drinking-water facilities and standing water, which can breed mosquitoes and harbor chemical hazards, are among the common hazards associated with floods.

1. Related Work

Dania Eridani in the paper, "Monitoring System In LORA Network Architecture Using Smart Gateway In Simple Lora Protocol" [3] explained that different function of LoRa and its

architecture, Compare to the use of LoRa Wan, the throughput in this system has a stable result but smaller value. It occur because this system has data entry process into the database and provides web server services, which are not present in the LoRa gateway system in general.

Herman Yuliandoko, Sholeh Hadi Pramono in the paper, "Design of Flooding Detection System Based on Velocity and Water Level DAM with ESP8266" [4] Presented that flooding detection is very important and the flooding detection can use velocity, water level detection on dam. The ESP8266 is very power full to manage sensor detection, this micro-controller also have a minimum power consumption which very useful on rural applications. The application of ESP8266 in rarely used and most studies use wireless sensor networks.

Anto Merline Manoharan, in their paper "Smart Water Quality Monitoring And Metering Using LORA For Smart Villages" [5] described that The solution for the smart water distribution and quality monitoring in smart villages, and solution is provides a alternate solution for networking where cellular network is not available These Lora-Wan is suitable in-forest area and mountains where the cellular network is not available. The proposed system will save water and provide goof quality of water to people.

Asaad Ahmed Mohammedahmed Eltaieb and Zhang Jian Min, in this paper "Automatic Water Level Control System" [6] involves designing and development of automatic water level control

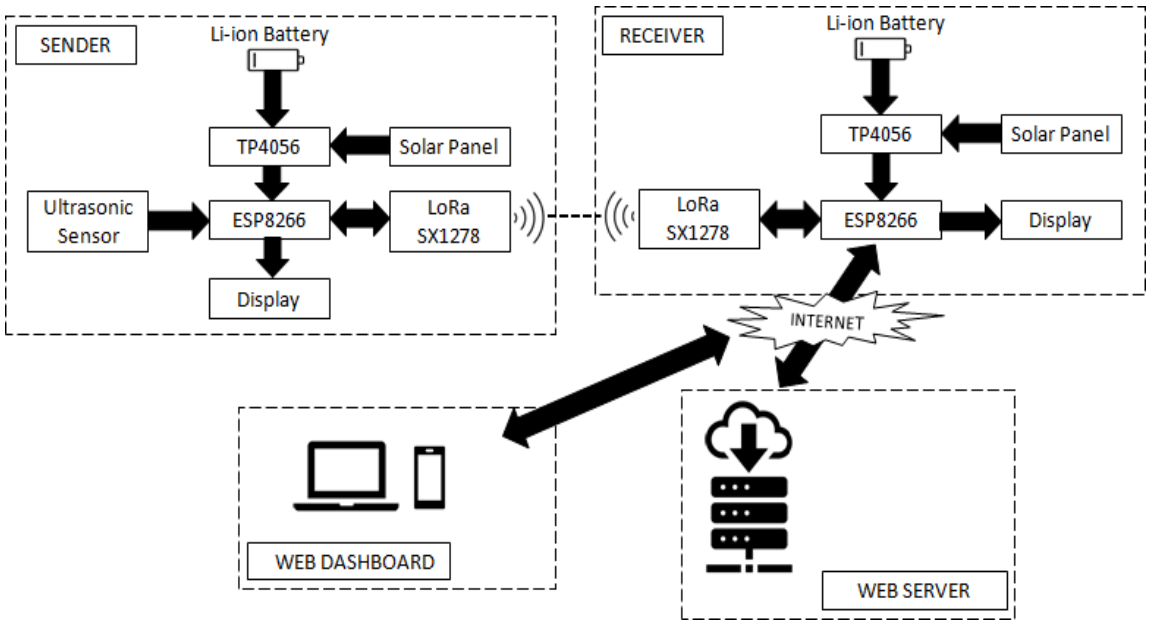
system had exposed to the better way of software and hardware architecture that blends together for the interfacing purposes. The system employs the use of advance sensing technology to detect the water level. It uses Arduino and uses relay to control motor. Different wires are attached at different Junctions of the Beaker. When we pour water in the beaker. The water comes in contact with the wire and tells the level of water in the dams. Accordingly, they have displayed the level of water onLCD display.

Chellaswamy C, Nisha J, Sivakumar K, and Kaviya R in the paper "An IoT Based Dam Water Management System for Agriculture [11]" proposes an Internet of Things (IoT) based dam water management system (IoT-DWM) for reducing water wastage and decreasing water scarcity in agriculture fields. The system consists of field sensors, an IoT network, and a dam controller that estimates water requirements based on various parameters. The system has been tested in the Thanjavur district of India and simulation results show that it saves a considerable amount of water. An experimental setup has been developed and tested for large-scale water management.

Jo˜ao Mesquita ang Diana Guimar˜ in their papper "Assessing the ESP8266 WiFi module for the Internet of Things [14]", The ESP8266 module is a low-cost, WiFi-enabled device that has potential for battery-powered IoT applications with short transmission intervals. In this study, the authors characterize the module's energy consumption, communication range, and sleep modes, and find that it offers good connectivity within common building deployments with packet delivery ratios of 99% or higher on the same floor, but still usable across floors. Future work will assess the module's performance during handovers and in non-infrastructured use cases.

Alessio Carullo and Marco Parvis in their paper "An Ultrasonic Sensor for Distance Measurement in Automotive Applications [15]", describes a low-cost ultrasonic sensor that measures the distance between the ground and selected points of a motor vehicle using the time of flight of an ultrasonic pulse. The sensor employs a constrained optimization technique to detect reflected pulses and self- adapts to environmental conditions, producing accuracy of better than 1 mm. The sensor works at speeds of up to 30 m/s and is suitable for headlight leveling and active suspension systems.

2. Block Diagram



3. Hardware Description

Lora

The ultra-long-range low-power data transmission technology used in the LPWAN (low-power wide-area network), also known as LoRa, operates at frequencies below 1 GHz (LoRa for short). A few important features include long range, with a maximum transmission distance of 20 km, low power consumption, with a battery life of 5 to 10 years, and low rate, with a maximum transmission speed of only a few hundred kbps[1].

Low-power (battery-powered), end-node transmission that can transfer a certain number of data packets in a certain amount of time is the aim of LoRa research [2].

The wireless module uses the SX1278 device, employing a high spreading factor to send out tiny capacity data over a broad radio band. With a reception sensitivity of up to -148 dbm, it mostly operates in the unlicensed band of frequencies between 137433 and 525433 MHz, including 433 MHz. In open places, the coverage can extend for more than 3 KM between buildings and up to 15 km [1].

Ultrasonic Sensor

The ultrasonic sensor is equipped with a transmitter and a receiver, both of which use commercial 40 kHz piezoelectric resonant transducers. When activated, the transmitter sends out an ultrasonic pulse that lasts for 200 milliseconds before waiting for the return signal. The receiver then detects the echoes of the ultrasonic waves that bounce back from nearby objects and converts them intoelectrical signals, which are used to calculate the distance between the sensor and the objects. Overall, ultrasonic sensors are commonly used in distance sensing applications due to their low cost and reliability [7].[9]

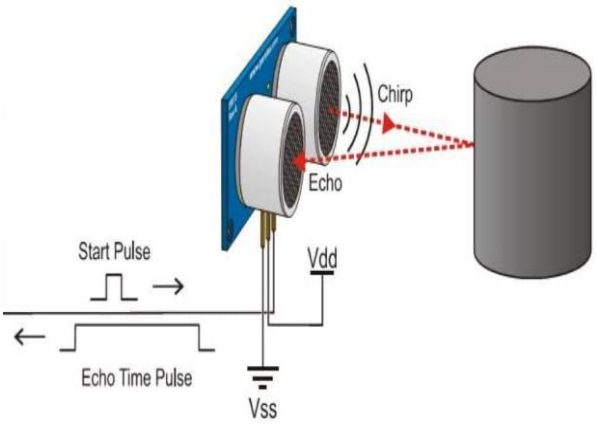


Fig. 1.Ultrasonic working theory [12]

These transducers, which are frequently used in anti-thief systems, are easily accessible in water- resistant containers and cost around $1. The generated signal has a period of 25 s, which is equivalent to a wavelength of approximately 9 mm at 20 C. Therefore, a subwavelength detection is required to obtain the required uncertainty [7].

The goal of ultrasonic rangefinders is to measure the amount of time it takes for a signal to travel from the transmitter to the receiver. The signal's rate of propagation is known. This paper examines the HC-SR04 ultrasonic rangefinder. The sensor is made up of an ultrasonic wave-generating transmitter, an echo-perceiving receiver, and support nodes for the module's regular functioning [8].

When an object is touched by an ultrasonic wave travelling at a speed of around 344 m/s (sound wave velocity), the wave is reflected back to the sensor [9].

4.3. Esp8266

The ESP8266 is a micro controller with minimum power consumption. The ESP8266 also has wireless tools which can be integrated with internet networks. This ability makes the data sensors can be sent web servers and smart phone applications to inform the flooding alert [9].

Despite the importance of low power consumption, the communication is effective if within range, only, thus imposing a trade-off between communication range and transmission power. Studying this trade-off in detail is beyond the scope of this paper, but we are interested in assessing the practical communication range in low power indoor scenarios, as in a manufacturing plant [10].

The module features an on-board antenna which is particularly suited to be embedded in small devices. These antennas present a rather non-uniform radiation pattern, with a toroidal geometry revolving around the module and the axis perpendicular to the antenna longitudinal direction [11].

4.4. TP4056

The TP4056 is a linear charger designed for single cell lithium-ion batteries. It features a low external component count and a small SOP package, making it ideal for portable applications. The internal PMOSFET architecture eliminates the need for a blocking diode, and prevents negative charge current. The charger regulates the charge current to limit the die temperature during high power operation or high ambient temperature. The charge voltage is fixed at 4.2V, and the charge current can be programmed with a single external resistor. The TP4056 terminates the charge cycle when the charge current drops to 1/10th the programmed value after the final float voltage is reached. It also includes features such as current monitoring, under voltage lockout, automatic recharge, and two status pins to indicate charge termination and input voltage. The TP4056 is able to charge single cell Li-Ion batteries directly from a USB port and has a preset 4.2V charge voltage with 1.5% accuracy. It also includes soft-start limits to limit inrush current. The TP4056 is available in an 8-lead SOP package, with an optional radiator that needs to be connected to GND [16].

OLED

An OLED (Organic Light Emitting Diode) Display is a thin, lightweight and flexible display technology that provides brighter and more vivid colors compared to traditional LCD displays. The 128x64 OLED Display Module is a popular OLED display that is commonly used in various electronic devices, such as digital cameras, mobile phones, and portable media players.

This OLED display module has a resolution of 128x64 pixels, which provides clear and sharp images. It is designed with a built-in controller IC (SSD1306) that allows easy communication

with microcontrollers via I2C or SPI interfaces. The display is also equipped with an internal voltage regulator that enables it to operate with a supply voltage between 3V and 5V, making it suitable for use with a wide range of microcontrollers and development boards.

The OLED display module has a high contrast ratio and fast response time, which makes it ideal for displaying graphics and animations. It also has a wide viewing angle, which ensures that the display remains visible even when viewed from different angles. Additionally, the display has a low power consumption and can be used in battery-powered devices without significantly affecting battery life.

Overall, the 128x64 OLED Display Module is a versatile and cost-effective display solution for a wide range of electronic devices. It is easy to integrate and provides clear and vibrant images, making it a popular choice among electronics enthusiasts and hobbyists [17].

Li-ion batteries

Li-ion batteries are rechargeable batteries that have gained widespread popularity due to their high energy density, low self-discharge rate, and long cycle life. A 3.7V Li-ion cell rechargeable battery is a type of Li-ion battery that has a nominal voltage of 3.7V and can be recharged multiple times [18].

The 3.7V Li-ion cell rechargeable battery typically consists of a cathode made of lithium cobalt oxide, an anode made of graphite, and an electrolyte made of lithium salts dissolved in organic solvents. These components work together to facilitate the movement of lithium ions between the cathode and anode during charging and discharging cycles [19].

These batteries are commonly used in portable electronics such as smartphones, laptops, and tablets, as well as electric vehicles and renewable energy systems. However, it is important to note that Li- ion batteries have some safety concerns such as overheating and fire hazards if not handled properly[18].

6. Working

Your project sounds interesting and useful. A smart water dam management system is an innovative idea that can help monitor water levels and prevent any potential disasters that may occur due to the rise in water levels. With the help of Node MCU ESP8266, you can manage and control all the hardware components attached to it, including the ultrasonic sensor and the Lora module for data transfer.

Using an ultrasonic sensor to measure the distance between the water surface and the sensor itself is an accurate and reliable way to determine water levels. The ultrasonic level transmitter mounted on the top of the dams transmits an ultrasonic pulse down into the dams, which reflects back to the transmitter from the liquid surface. The time delay between the transmitted and received echo signal is measured, and the microprocessor calculates the distance to the liquid surface, providing real- time data on the water level.

The Lora module is an excellent choice for transmitting data over long distances without an internet connection. It can transmit data up to 4 km, which is more than sufficient for your project. The data collected from the ultrasonic sensor can be sent to the server via the Lora module, where it can be stored and retrieved when needed.

The LCD display can be used to show the real-time distance of water level to anyone who needs it. However, you have taken it to the next level by incorporating a user-friendly application that allows the user to ask the neo dams about the water level. The real-time data will be fetched from the online server, and the user will receive the information on their smartphone screen. This provides an efficient and convenient way for users to monitor water levels, preventing any potential hazards.

The alert system you have created is impressive, as it allows users to inquire about the water level status, and the ESP8226 Wi-Fi module will collect the information from the sensor. With the help of Wi-Fi and internet, the data will be stored in the server and converted into a telegram bot message reply with the help of backend code. This provides an easy way for users to get the information they need quickly and efficiently.

7. Conclusion

We have designed an application and completed its partial development. Our application will provide real-time data on the water level which will be based on the status of

the dam. In dangerous
situations our application will give an alert message to villagers, We have applied engineering knowledge to analyse the problem of interior designing of healthcare systems, and village offices and to take care of reservoirs, etc. Then we designed the application in two modules. We have investigated the available application to find out the new solutions and updates. We have used a hardware Lora (long-range radio) Modern tool for the implementation of the device and to make our application. During this project, we applied professional ethics and understood the importance of teamwork and communication while presenting projects in various competitions and conferences for project management. This solution can be developed at a generalized level for multiple sectors for life-long learning.

8. Acknowledgement

We would like to acknowledge the Department of Electronics Engineering for the support extended for the completion of this work. We would like to express our special thanks to the guide As well as H.O.D of the Electronics Department Prof. V. N. Mahawadirwar for their wholehearted Co- Operation and valuable suggestions, technical guidance throughout the work, and kind official support given and encouragement. We would also thank our friends for their encouragement in completing this work.

References

1. Changjiang Xie, “Research and application of key technologies for dam safety monitoring based on LoRa”, IOP Conference Series: Earth and Environmental Science, Volume 768, 2021 6th International Conference on Minerals Source, Geotechnology and Civil Engineering 9-11 April 2021.
2. Dania Eridani, Eko Didik Widianto, Richard Dwi Olympus Augustinus, Al Arthur Faizal,” Monitoring System in Lora Network Architecture using Smart Gateway in Simple LoRa Protocol”, 2019, International Seminar on Research of Information Technology and Intelligent Systems (ISRITI)
3. Herman Yuliandoko, Sholeh Hadi Pramono.“Design Of Flooding Detection System Based On Velocity And Water Level DAM With ESP8266”. 2017 2nd International Conferences On Information Technology, Information System And Electrical Engineering(ICITISEE).
4. Anto Merline Manoharan.“Smart Water Quality Monitoring And Metering Using LORA For Smart Villages”. 2nd International Conference On Smart Grid And Smart Cities.
5. Alessio Carullo and Marco Parvis, “An Ultrasonic Sensor for Distance Measurement in Automotive Applications”, IEEE SENSORS JOURNAL, VOL. 1, NO. 2, AUGUST 2001
6. V A Zhmud , N O Kondratiev , K A Kuznetsov , V G Trubin , L V Dimitrov, “Application of ultrasonic sensor for measuring distances in robotics”, International Conference Information Technologies in Business and Industry 2018 IOP Publishing IOP Conf. Series: Journal of Physics.
7. Herman Yuliandoko, Subono, Vivien Arief Wardhany, “Design of Flooding Detection System Based on Velocity and Water Level DAM with ESP8266”, 2017 2nd International Conferences on Information Technology, Information Systems and Electrical Engineering(ICITISEE)
8. Joao Mesquita , Diana Guimaraes , Carlos Pereira, Frederico Santos, Luis Almeida, “Assessing the ESP8266 WiFi module for the Internet of Things”, 2018 IEEE 23rd International Conference on Emerging Technologies and Factory Automation (ETFA)
9. Chellaswamy C, Nisha J, Kaviya R, Sivakumar K, “An IoT Based Dam Water Management System for Agriculture”, 2018 IEEE 23rd International Conference on Emerging Technologies and Factory Automation (ETFA)
10. STMicroelectronics, Low cost PCB antenna for 2.4GHz radio: Meander design, AN3359Application note, March 2011

11. https://www.researchgate.net/figure/Gambar-2-Prinsip-Kerja-Sensor-Ultrasonik-Jarak-Lebar-Pulsa-29034uS-2dalam-cm_fig1_311614537/amp
12. Alessio Carullo and Marco Parvis,"An Ultrasonic Sensor for Distance Measurement in
13. Automotive Applications",IEEE SENSORS JOURNAL, VOL. 1, NO. 2, AUGUST 2001.
14. TP4056 1A Standalone Linear Li-lon Battery Charger with Thermal Regulation in SOP-8Datasheet
15. "128x64 OLED Display Module." Adafruit Industries, https://www.adafruit.com/product/326. Accessed 27 Feb. 2023.
16. "Lithium-ion Battery." Wikipedia, Wikimedia Foundation, 23 Feb. 2023, https://en.wikipedia.org/wiki/Lithium-ion_battery.
17. "How Do Lithium-ion Batteries Work?" Explain that Stuff, 18 Sept. 2019, https://www.explainthatstuff.com/lithiumionbatteries.html

SMART MEDICAL DATA CARD WITH EMBEDDED QR AND MANAGEMENT SYSTEM: A REVIEW

Mrs. Priyanka Padmane[1], Anusha Gahukar[2], Gokul Iyer[3]
[1,2,3]Department of Computer Technology, Priyadarshini College of Engineering, Nagpur, India
priyankapadmane13@gmail.com, anusha.gahukar@gmail.com, gokuliyer786@gmail.com

ABSTRACT

After Covid 19 we all understood the importance of healthcare systems, of how beds and oxygen cylinders were not available when in need. We got a reality check of our healthcare systems and how it needs to be improved to avoid further such problems. Information technology has always played a significant role in the development of healthcare systems. Good healthcare system is important for any country and is beneficial for its national interest. India is one of the overpopulated country and thus the healthcare system should really benefit the citizens. One of the most remarkable application of it is managing patient's data through centralized database in the form of electronic health records (EHR). The aim of this proposed E- health card is to improve, access and accountability of healthcare services. It has a QR embedded in it, which is unique for every patient and provides us a secure access to our healthcare information such as medical history and reports whenever and wherever we need it using Oracle Apex.

Keywords: *E health card, QR, Oracle apex, Healthcare system, Information Technology*

I. Introduction

Advance Health care system is one of the biggest issues for developing countries. According to the World Health Organization half of the world lacks access to essential health services. Getting medical assistance is one of the most basic right of our citizens and defines the healthcare status of our country. India has a population of more than 1 billion, which makes advanced healthcare system very necessary. Information Technology has proved its worth in Healthcare Industry and relies on it in many ways. It helps hospitals to store computerized registries, Electronic prescriptions, Telehealth i.e. having an appointment via video call. Not only this various tools and devices comes handy while performing operations and surgeries. With the help of Information technology we can develop advance health care system step by step. In this thesis we'll understand about how Electronic Health Record (EHR) Integration is changing Healthcare for the better.

II. Electronic Health Records

Electronic Health records provides much more security than traditional methods of writing everything over a paper. Paper files can be easily lost causing serious problems to the patients. Unknowns and unauthorized people can also access these files if left in open. Electronic Health records on the other hand are encrypted with password protected system. We can also create an audit trail of who visited our records. We can also backup our data and much more.

E-Health record is considered the most appropriate situation to improve the quality and safety of health care. Health Data Management does not limit to organizing medical data but also integrating it. The goal is to make patient care more efficient by retrieving, deleting, updating data anytime while protecting the privacy and security of the data. The permanent storage of patient's data in one place can result in quick access and derive better insights during operations and surgeries.

III. What Is E-Health Card?

A health-care information management system is defined as software consisting of a collection of procedures and programs for manipulating data having security. Electronic Health Card is just like an I-card which consists basic information of patient and a QR code which helps the doctor to access the entire medical history of the patient with a scan. This E-health card will possess the details of every test, every report, details of the doctor's visit, what medications are taken by the patient and an individual's diagnosis. Since this card is portable and easily accessible, hence this information is advantageous even if the patient

migrates to a new place or consults a new doctor. The information can be accessed by everyone through a web application.

Along with these features, E-health card is secured unlike paper documents which can get lost easily. Any changes which needs to be made requires password and login credentials.

IV. Project Overview

Now, according to most of the research papers and studies these technologies such as hospital management systems are beneficial to hospitals and individual organizations. But our purpose of making the E- health card is with respect to people. In today's world there are many E-health cards but the differentiating factor of the E- health card which we are proposing is QR embedded. Beside basic information present on the card, QR code is also embedded which is unique for each patient.

Suppose you're visiting the doctor for any appointment or operation at that time you don't need to carry the whole file of documents with you. By simply scanning the QR code on your card, you can easily get access to all of your medical history, reports, documents etc. Also in emergency situations when you meet an accident and needs to be treated immediately at that time doctor can access your whole medical history with a scan.

V. Project Function

A web application with a friendly interface has to be developed to store and manage the entire medical records of the patient on a card with the help of QR code and in a server to avoid loss of data. Oracle Database can be used to maintain adequate privacy and security of data.The portable smart health card contains the entire medical record of the user and the embedded OR enables the user to view the all the health related information of the cardholder. It is a classic example of database management in real time.

VI. Target Audience

The E-Healthcare is very versatile when it comes to targeted audience. It can be used in every possible regions, may it be an individual or at private sectors or by armed forces. Every person should have a E-health card and should not worry about carrying all those files around ever again.

VII. Future Scope

There is a huge scope of such new technologies in the future. The idea is to create a centralized healthcare system which could help the individuals to keep track of all the health related issues, may it be vaccination records or medical prescriptions. All of the documentation at one place. For e.g. When we got vaccinated during covid, there were many vaccination centers but all of the data was well maintained in a centralized system (COWIN),no matter what place you took vaccination from, by simply providing them with your mobile number all the vaccination details were well organized and secured in their system.

A system which can send you notifications of every update you make as well as send you alerts of upcoming events such as refilling of prescription or appointments with doctor. A fully functioning one stop solution for all your healthcare needs.

A health-card with the ability of storing your medical records as well as capable of making transaction is the main aim. A fully functioning product which tracks your medical records as well as keeps a track all your medical bills may it be bills of medicines or bills of a surgery, we can simply make transaction with our card which has to be recharged timely to add money. This feature allows you to keep track of the money we have spent in healthcare related transactions.

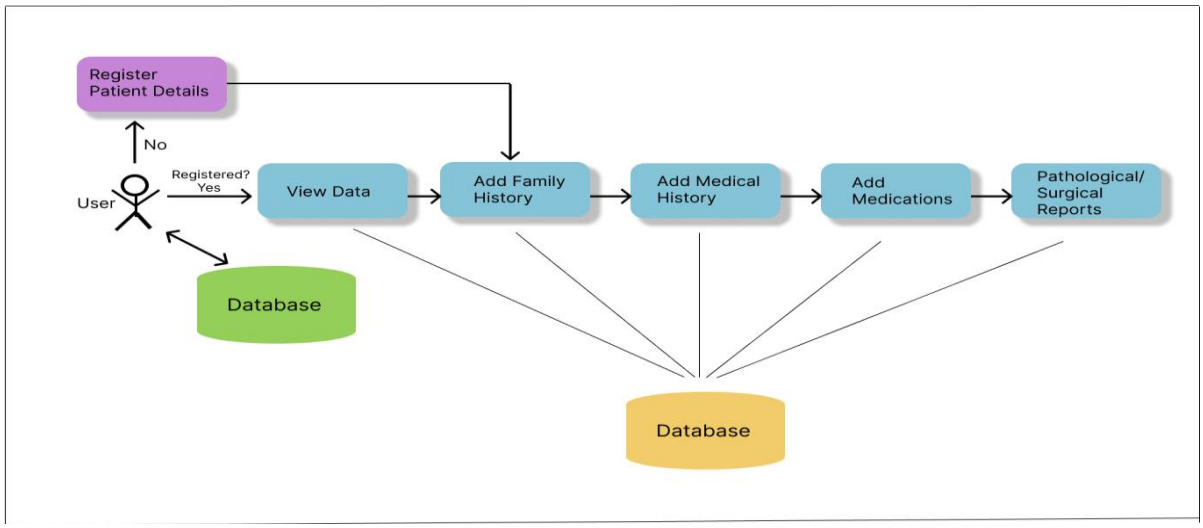


Figure A: DFD of the management system

Figure B: Example of Health card

VIII. Conclusion

In this survey, we conducted a comprehensive study regarding advance healthcare management system and how we can expand it by introducing centralized database.

One stop solution for your every health related issue, whether its storing our medical history and reports or to generate e-bills or to maintain health related transactions that too with adequate security. The most important factor of it is QR embedded, which makes it handy as well. With its help we can access the necessary information of the patient anytime anywhere.

References

1. A. Georgoulas; A. Giakoumaki; D. Koutsouris. "A multilayered architecture for the development of smart card-based healthcare application,"Proceedings of the 25th Annual International Conference of the IEEE Engineering in Medicine and Biology Society (IEEE Cat. No.03CH37439) 17-21 Sept. 2003
2. Kumaran S*, Dr Pusphagaran, KalaiSelvi, Christopher, Deepak. "A Study of Advanced Hospital Management System," IOSR Journal of Dental and Medical Sciences (IOSR-JDMS) e-ISSN: 2279-0853, p-ISSN: 2279-0861.Volume 16, Issue 2 Ver. III (February. 2017), PP 127-134
3. Reyaz Ansari, Raj Singh, Ali Shoiab, Hemant Kumar. "Hospital Management System," International Research Journal Of Engineering and Technology, vol. 9, Issue 7, July 2022.
4. Vidhya Krishna, "Introduction of an international health card in Healthcare Information System," International Journal of Advances in Electronics and Computer Science, ISSN: 2393-2835 Volume-3, Issue-11, Nov.-2016.
5. Marina Jovanović Milenković, Dejan Milenković & Veljko Jeremić. "Introduction and Implementation of Electronic Health Card" Innovative Management and Firm Performance pp 444–464.
6. [6].R. Beuscart and P. Paradinas. "Smart Cards for Health Care, in Telematics in Medicine,Elsevier Science Publishers B.V., North-Holland, 1991.

PATHFINDER: SHORTEST PATH FINDING ALGORITHMS VISUALIZER

Himanshu Gokhale, Ram Patil, Sanket S. Patrikar, Sameeksha Wairagade,

Prof. Y .D. Choudhari

Department of Information TechnologyKarmaveer Dadasaheb Kannamwar College of Engineering Nagpur,Maharashtra, India

himanshurgokhale.it@kdkce.edu, ramdpatil.it@kdkce.edu.in, sanketspatrikar.it@kdkce.edu.in sameekshaswairagade.it@kdkce.edu.in, yogeshri.choudhari@kdkce.edu.in

ABSTRACT

Shortest path finding is a classic problem in the field of optimization and has been studied extensively in computer science and mathematics. This project aims to provide an interactive visualizer, allowing users to experiment with various algorithms and heuristics in order to gain a better understanding of the problem and its solutions. The visualizer includes a variety of exhaustive and heuristic algorithms, as well as options for customizing the problem size and algorithm parameters.

Keywords*: Shortest Path Finding, optimization, algorithms, heuristics, interactive visualizer.*

I. Introduction

Shortest pathfinding is a classic mathematical optimization problem. It involves finding the shortest possible route between a set of cities, visiting each city exactly once and then returning to the starting city. The problem has a wide range of applications, including logistics, transportation, and circuit board drilling. Despite its wide-ranging applications, finding the optimal solution is an NP-hard problem, meaning that it becomes computationally infeasible as the number of cities increases. [1]

In response to this challenge, the Pathfinder project was developed. The project aims to provide a solution to the pathfinding that can be visualized and interacted with. It includes several algorithms to solve the pathfinding, including heuristic and exhaustive methods. Users can input a set of cities, and the project will generate an optimal route between them using the selected algorithm. The visualizer also allows users to compare different algorithms and evaluate their performance on the same problem.

In this paper, we will provide an overview of the Pathfinder project, including its features, functionality, and limitations. We will also discuss the current state of understanding of the pathfinding within the discipline and compare the Pathfinder project to existing projects. Finally, we will provide an evaluation of the project's methodology and results, including an analysis of its efficiency, superiority, and gain.

II. Literature Survey

The literature survey is an important aspect of any research work that enables the researcher to investigate and understand the existing body of work related to the topic. In this section, we provide a brief comparison of Pathfinder with other existing projects along with a description of some of the related projects. [2]

Comparison of Pathfinder with Existing Projects

There are several projects available that focus on pathfinding. The most popular pathfinding solver is Concorde, which is a specialized software for solving the pathfinding. The main advantage of Concorde is that it provides an optimal solution for the problem. However, it has certain limitations, such as the need for the problem to be pre-processed to reduce the size of the search space, and the requirement for a specialized algorithm to solve the problem. [3]

In contrast, Pathfinder is an interactive tool that provides an intuitive interface for visualizing and comparing the different heuristic and exhaustive algorithms for solving the pathfinding. It allows the user to input custom data and experiment with different algorithms in real-time. Pathfinder

provides a comprehensive set of features, including support for multiple algorithms, visualization of the solution path, comparison of the algorithms, and support for multiple graph types.

Brief Explanation of Other Related Projects

Apart from Concorde and Pathfinder, there are several other projects that provide a solution to the pathfinding. One such project is LKH, which is an implementation of the Lin-Kernighan heuristic algorithm. LKH is a command-line tool and does not have a user-friendly interface like Pathfinder. Another project is OR-Tools, which is a software suite for combinatorial optimization problems. It provides a pathfinding solver that can solve large-scale problems efficiently. However, OR-Tools is primarily intended for use in a programming environment, and therefore, it may not be as accessible to non-programmers as Pathfinder.

In summary, Pathfinder stands out among the existing projects as a unique tool that provides an easy-to-use interface and real-time visualization for comparing different algorithms for solving the pathfinding.

III. Methodology

The methodology section of the paper provides a detailed overview of the proposed system design, problem definition, and the input, processing, and output of the Pathfinder (pathfinder). [4]

Problem Definition

Shortest pathfinding problem is a well-known optimization problem in computer science. The problem involves finding the shortest possible route that visits every city exactly once and returns to the starting city. This problem has a wide range of applications in areas such as logistics, transportation, and network optimization. [5] [6]

Proposed System Design

The proposed system design for the pathfinder is based on a user-friendly interface that allows users to input their data sets and visualize the optimization process. The system is designed to support multiple input formats such as CSV and JSON, making it easy for users to import their data sets into the pathfinder.

Input → Processing → Output of the Pathfinder

The pathfinder's input stage involves loading the user's data set into the system. The system then preprocesses the data by calculating the distance between each city and creating a matrix of distances. The matrix of distances is then passed to the processing stage, where the pathfinder's algorithm is applied to find the optimal path.

The processing stage of the pathfinder involves applying a range of algorithms such as the Nearest Neighbor Algorithm and the 2-Opt Algorithm to find the optimal route. The output of the processing stage is the shortest possible route that visits every city exactly once and returns to the starting city.

The output stage of the pathfinder involves visualizing the results of the optimization process. The systempresents the optimal route on a map, highlighting the path taken by the traveler. The output also provides users with a range of statistics such as the total distance traveled and the time taken to complete the route.

Overall, the proposed system design for the pathfinder provides users with a simple and effective way to solve the Shortest Pathfinding Problem, allowing users to input their data sets and visualize the optimization process in a user-friendly interface.

IV. Future Work

While Pathfinder has proven to be a useful tool in visualizing and understanding the solutions to the problem, there are still several areas that could be further developed to improve its functionality and performance.

First, the current implementation of Pathfinder uses a brute-force algorithm to find the optimal solution, which can be computationally expensive for large datasets. In future work, more efficient algorithms suchas the Christofides algorithm or the Lin-Kernighan heuristic could be implemented to speed up the optimization process.

Second, the current version of the Pathfinder only supports the Euclidean distance metric. In

future work, additional distance metrics such as the Manhattan distance [7] or the Euclidean squared distance could be added to allow users to explore different distance measures and their impact on shortest path finding.

Third, Pathfinder currently only supports visualizing the optimal solution. In future work, the tool could be extended to also visualize suboptimal solutions, allowing users to explore the quality of different approximate algorithms.

Finally, Pathfinder currently only supports two-dimensional visualizations. In future work, the tool could be extended to support three-dimensional visualizations [8], which could be particularly useful in the context of applications such as route planning or logistics.

Overall, there is much potential for future work on the shortest pathfinding, and we believe that further development of this tool could help advance the field of pathfinding and its applications in various industries. [9]

References

1. K. Ilavarasi and K. S. Joseph, "Variants of traveling salesman problem: A survey," International Conference on Information Communication and Embedded Systems (ICICES2014), 2014, pp. 1-7, doi: 10.1109/ICICES.2014.7033850.
2. Dahiya, C., & Sangwan, S. (2018). Literature Review on the Traveling Salesman Problem. International Journal of Research, 5(16), 1152-1155. Retrieved from https://journals.pen2print.org/index.php/ijr/article/view/15490
3. Joshi, Chaitanya K. et al. “An Efficient Graph Convolutional Network Technique for the Travelling Salesman Problem.” ArXiv abs/1906.01227 (2019): n. pag.
4. Magzhan, Kairanbay, and Hajar Mat Jani. "A review and evaluations of shortest path algorithms." International journal of scientific & technology research 2.6 (2013): 99-104.
5. Kumari, S. Meena, and N. Geethanjali. "A survey on shortest path routing algorithms for public transport travel." Global Journal of Computer Science and Technology 9.5 (2010): 73-76.
6. Madkour, Amgad, et al. "A survey of shortest-path algorithms." arXiv preprint arXiv:1705.02044 (2017).
7. Cohen, Liron, et al. "The FastMap algorithm for shortest path computations." arXiv preprint arXiv:1706.02792 (2017).
8. Wang, Miao, and Hanyu Lu. "Research on algorithm of intelligent 3D path finding in game development." 2012 International Conference on Industrial Control and Electronics Engineering. IEEE, 2012.
9. Rachmawati, Dian, and Lysander Gustin. "Analysis of Dijkstra’s algorithm and A* algorithm in shortest path problem." Journal of Physics: Conference Series. Vol. 1566. No. 1. IOP Publishing, 2020.

SURVEY ON FAKE NEWS DETECTION

Dr. S.P. khandai[t1], Ayush Shirsat[2], Aditya Bhagat[3], Aditya Balbudhe[4], Kumar Manglam[5] and Vaishnavi Wange[6]

sunanda.khandait@kdkce.edu.in, ayushshirsat2001@gmail.com, bhagataditya456@gmail.com , adityabalbudheo@gmail.com, vywange@gmail.com ,urmanglam@gmail.com

ABSTRACT

Fake News has become one of the major problems in the existing society. Fake News has high potential to change opinions, facts and can be the most dangerous weapon in influencing society. There are Several approaches or Techniques for detecting the 'fake news', that is, misleading news stories which comes from the non-reputable sources. Over the period of time many researchers have used different methods, algorithms, tools and techniques to identify fake news content from online social networks. This paper makes an analysis of the research related to fake news detection and explores the Various approaches like traditional machine learning models Such as Logistic Regression, Decision Tree, Support Vector Machine, Random Forest, Naive Bayes , etc.

I. Introduction

The world is changing rapidly. No doubt we have several advantages of this digital world but it also has its disadvantages as well. There are different issues in this digital world. One of them is fake news. Fake news detection (FND) has recently picked the attention of a large number of academics, with many sociological studies demonstrating the effect of fake news and how people respond to it. To describe fake news as any material capable of making readers believe in information that is not real, one must first define what false news is [1].

The data science community has responded by taking actions against the problem. It is impossible to determine news as real or fake accurately. So, the proposed project uses the datasets that are trained using count vectorizer method and Vectorizer for the detection of fake news and its accuracy will be tested using machine learning algorithms .

Spreading false news widely harms society and the person. Initially, this kind of false news has the potential to change or destroy the authenticity balance in the news ecosystem.

As an increasing amount of our lives is spent interacting online through social media platforms, more and more people tend to seek out and consume news from social media rather than traditional news organizations. The reasons for this change in consumption behaviours are inherent in the nature of these social media platforms: (i) it is often more timely and less expensive to consume news on social media compared with traditional news media, such as newspapers or television; and (ii) it is easier to further share, comment on, and discuss the news with friends or other readers on social media.

There has been a rapid increase in the spread of fake news in the last decade, most prominently observed in the 2016 US elections [5]. Such proliferation of sharing articles online that do not conform to facts has led to many problems not just limited to politics but covering various other domains such as sports, health, and also science [3],[7]. One such area affected by fake news is the financial markets [6], where a rumour can have disastrous consequences and may bring the market to a halt. Our ability to take a decision relies mostly on the type of information we consume; our world view is shaped based on the information we digest. There is increasing evidence that consumers have reacted absurdly to news that later proved to be fake [5]. One recent case is the spread of novel corona virus, where fake reports spread over the Internet about the origin, nature, and behaviour of the virus.

Fortunately, there are several computational techniques that can be used to mark certain articles as fake on the basis of their textual content. The majority of these techniques use fact checking websites such as “PolitiFact” and “Snopes.” There are a number of repositories maintained by researchers that contain lists of websites that are identified as ambiguous and fake [7]. However, the problem with these resources is that human expertise is required to identify articles/websites as fake.

This paper describes a simple fake news detection method based on some of the

machine learning algorithms. The goal of the research is to examine how these algorithms works for this problem, given a manually label news dataset, and to support (or not) the idea of using artificial intelligence for fake news detection. Further, this technique can easily be applied to social platforms like Facebook and Twitter by adding the latest news and enhancing the dataset on a regular basis. We can web scrap other websites news and then check on our model whether the news is fake or real.

II. Related Work

Authors of [3] propose a typology of several methods of truth assessment emerging from two main categories: linguistic cue approaches with machine learning and network analysis approaches, for detecting fake news. This approach is being tested on a set of data from twitter and Facebook news.

In [5], authors presented a simple approach to fake news detection using a naive Bayesian classifier. This approach is tested on a set of data extracted from Facebook news posts. They claim to be able to achieve an accuracy of 74%. The rate of this model is good but not the best, as many other works have achieved a better rate using other classifiers.

Authors of [1] propose a fake news detection model that uses n-gram analysis and machine learning techniques by comparing two different feature extraction techniques and six different classification techniques. The experiments carried out show that the best performances are obtained by using the so-called features extraction method (TF-IDF). They used the Linear Support Vector Machine (LSVM) classifier that gives an accuracy of 92%.

This model uses LSVM that is limited to treating only the case of two linearly separated classes.

Linguistic analysis model on tweets has been used by Amitabha Dey et. al [9] with customized dataset of "Fake Tweets on Hillary Clinton from Fresh News", Truth Feed, Christian Times Newspaper sources had been used also Credible tweets from Reuters, The Economist, CNN used in the process. Sentiment analysis has been done to expose hidden bias towards the subject and applied k-nearest neighbour algorithm with 66 % accuracy however BoW models will lead to improved accuracy.

In [6], the authors present an overall performance analysis of different approaches on three different datasets. This work focused on the text of the information and the feeling given by it, and ignores some features like the source, the author or the date of the publication that can have a dramatic impact on the result. Besides, in our work, we will show that the integration of the feeling in the detection process does not bring any valuable information.

Authors of [10] created a new public dataset of valid new articles and proposed a text - processing based machine learning approach for automatic identification of Fake News with 87% accuracy. It appears that this work focuses on the emerging feelings from the text and not on the content of the text.

III. Methodologies

Few Methodologies used by researchers:

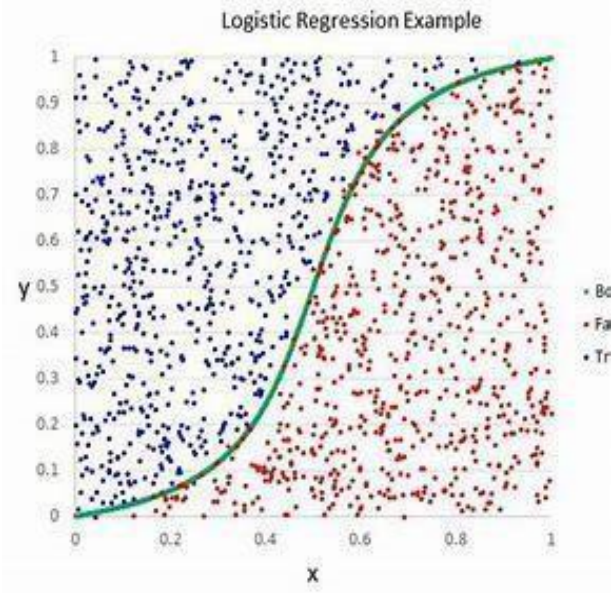
1. Logistic Regression: This type of statistical model (also known as logit model) is often used for classification and predictive analytics. Logistic regression estimates the probability of an event occurring, such as voted or didn't vote, based on a given dataset of independent variables. Since the outcome is a probability, the dependent variable is bounded between 0 and 1. In logistic regression, logit transformation is applied on the odds—that is, the probability of success divided by the probability of failure. This is also commonly known as the log odds, or the natural logarithm of odds, and this logistic function is represented by the following formulas:

$$\text{Logit}(pi) = 1/(1+ \exp(-pi))\text{-------}(1)$$

$$\ln(pi/(1-pi)) = \text{Beta\_0} + \text{Beta\_1}*X\_1 + \ldots + B\_k*K\_k \text{-------}(2)$$

In this logistic regression equation, logit(pi) is the dependent or response variable and x is the independent variable. The beta parameter, or coefficient, in this model is commonly estimated via maximum likelihood estimation (MLE). This method tests different values of beta through multiple iterations to optimize for the best fit of log odds. All of these iterations produce the log likelihood function, and

logistic regression seeks to maximize this function to find the best parameter estimate. Once the optimal coefficient (or coefficients if there is more than one independent variable) is found, the conditional probabilities for each observation can be calculated, logged, and summed together to yield a predicted probability. For binary classification, a probability less than .5 will predict 0 while a probability greater than 0 will predict 1. After the model has been computed, it's best practice to evaluate how well the model predicts the dependent variable, which is called goodness of fit.



2. Decision Tree (DT): DT is an important supervised learning algorithm. Researchers tend to use tree-based ensemble models like Random Forest or Gradient Boosting on all kinds of tasks. The basic idea of DT is that it develops a model to predict the value of a dependent factor by learning various decision rules inferred from the whole data. Decision Tree has a top-down structure and shapes like a tree in which a node can only be a leaf node which is binding with a label class or a decision node which are responsible for making decisions. Decision Tree is easily understandable about the process of making the decisions and predictions. However, it is a weak learner which means it may have bad performance on small datasets.

The key learning process in DT is to select the best attribute. To solve this problem, various trees have different metrics such as information gain used in ID3 algorithm, gain_ratio used in this algorithm. A decision tree algorithm always tries to maximize the value of information gain, and a node/attribute having the highest information gain is split first. It can be calculated using the formula below:

Information Gain= Entropy(S)- [(Weighted Avg) *Entropy (each feature)]---(1)

Entropy(s)= -P(yes) log2 P(yes)- P(no) log2 P(no)------(2)

Where ,

- S= Total number of samples
- P(yes)= probability of yes
- P(no)= probability of n

3. Random Forest: Random Forest is an ensemble technique capable of performing both regression and classification tasks with the use of multiple decision trees and a technique called Bootstrap and Aggregation, commonly known as bagging. The basic idea behind this is to combine multiple decision trees in determining the final output rather than relying on individual decision trees. Random Forest has multiple decision trees as base learning models. We randomly perform row sampling and feature sampling from the dataset forming sample datasets for every model. This part is called Bootstrap. Since the random forest combines multiple trees to predict the class of the dataset, it is possible that some decision trees may predict the correct output, while others may not. But together, all the trees predict the correct output. Therefore, below are two assumptions for a better Random Forest classifier:

- There should be some actual values in the feature variable of the dataset so that the classifier can predict accurate results rather than a guessed result.
- The predictions from each tree must have very low correlations.

4. Support Vector Machine(SVM)[2]: SVM is one of the most popular Supervised Learning algorithms, which is used for Classification as well as Regression problems. However, primarily, it is used for Classification problems in Machine Learning. The goal of the SVM algorithm is to create the best line or decision boundary that can segregate n-dimensional space into classes so that we can easily put the new data point in the correct category in the future. This best decision boundary is called a

hyperplane.

SVM chooses the extreme points/vectors that help in creating the hyperplane. These extreme cases are called as support vectors, and hence algorithm is termed as Support Vector Machine.

The diagrammatic representation of Support Vector Machine.

5. Naive Bayes Classifier[4]: In machine learning, naive Bayes classifiers are a family of simple probabilistic classifiers based on applying Bayes theorem [8]. It predicts relationship probabilities for each class such as the probability that given record or data point belongs to a particular class. Naive Bayes classifier assumes that all the features are unrelated to each other. The presence or absence of a feature does not influence the presence or absence of any other feature. It is not a single algorithm for training such classifiers, but a family of algorithms based on a common principle of the number of times a particular event has occurred [1].

Naive Bayes has been studied extensively since the 1950s. It was introduced under a different name into the text retrieval community in the early 1960s and remains a popular baseline method for text categorization which is the problem of judging documents as belonging to one category or the other with word frequencies as the features. With appropriate pre-processing , it is viable in this domain with more advanced methods including support vector machines [9] resulting in improved accuracy.

IV. Conclusion

The conclusion of the analysis of the datasets using the five algorithms have been analyzed using the confusion matrix. The five algorithms used for the detection are as:

- Random Forests.
- Naive Bayes.
- Linear Regression.
- Decision Tree.
- SVM

Sr. No.	Approach	Accuracy Percentage (%)
1.	Random Forest	99.13%
2.	Naïve Bayes	96.34%
3.	Linear Regression	98.83%
4.	Decision Tree	98.87%
5.	SVM	99.43%

The accuracy of the result we get after the implementation of these algorithms are as follows, we get an accuracy of 99.434% when we perform the SVM. and 98.83% when we perform the logistic regression and 96.34% when we perform the Naïve Bayes and 99.135% when we perform the Random Forests and 98.87% when we perform the Decision Tree.

The task of classifying news manually requires in-depth knowledge of the domain and expertise to identify anomalies in the text. In this research, we discussed the problem of classifying fake news articles using machine learning models. The learning models were trained and para-meter tuned to obtain optimal accuracy. Some models have achieved comparatively higher accuracy than others. We used multiple performance metrics to compare the results for each algorithm.

References

1. Hadeer Ahmed, Issa Traore, and Sheriff Saad. “Detection of online fake news using n- gram analysis and machine learning techniques”. In International Conference on Intelligent, Secure, and Dependable Systems in Distributed and Cloud Environments, pages 127–138. Springer, 2017.
2. Chih-Chung Chang and Chih-Jen Lin. “LIBSVM – A Library for Support Vector Machines”, July 15, 2018.
3. Niall J Conroy, Victoria L Rubin, and Yimin Chen. “Automatic deception detection: Methods for finding fake news”. Proceedings of the Association for Information Science and Technology, 1–4, 2015.
4. Mykhailo Granik and Volodymyr Mesyura. “Fake news detection using naive bayes classifier”. In 2017 IEEE First Ukraine Conference on Electrical and Computer Engineering (UKRCON), pages 900– 903.

IEEE, 2017.
5. Kaggle. Getting Real about Fake News, 2016.
6. Junaed Younus Khan, Md Khondaker, Tawkat Islam, Anindya Iqbal, and Sadia Afroz. A benchmark study on machine learning methods for fake news detection. arXiv preprint arXiv:1905.04749, 2019.
7. Cristina M Pulido, Laura Ruiz-Eugenio, Gisela Redondo-Sama, and Beatriz VillarejoCarballido. “A new application of social impact in social media for overcoming fake news in health”. International journal of environmental research and public health, 17(7):2430, 2020.
8. Juan Ramos et al. “Using tf-idf to determine word relevance in document queries”. In Proceedings of the first instructional conference on machine learning, volume 242, pages 133– 142. New Jersey, USA, 2003.
9. Amitabha Dey, Rafsan Zani Rafi, Shahriar Hasan Parash, Sauvik Kundu Arko, Amitabha
10. Chakrabarty, “Fake News Pattern Recognition using Linguistic Analysis,” in the Proceeding of IEEE Joint 7th International Conference on Informatics, Electronics & Vision (ICIEV) and 2018 2nd International Conference on Imaging, Vision & Pattern Recognition (icIVPR), 2018.
11. DSKR Vivek Singh and Rupanjal Dasgupta. “Automated fake news detection using linguistic analysis and machine learning”. [11] William Yang Wang. " Liar, liar pants on fire": A new benchmark dataset for fake news detection. arXiv preprint arXiv:1705.00648, 2017.

ADVANCED-ELECTRONIC-IOT BASED INTELLIGENT SHOPPING TROLLY WITH AUTOMATIC BILLING SYSTEM

Priyanka D Vaidya[1], Dr. Rahul Pethe[2]
[1]Department of Electronics & Telecommunication VLSI Engineering
[2]Assistant Professor Dean, G H Raisoni Institute of Engineering and Technology, Nagpur
vaidyapriyanka749@gmail.com, rahul2480@gmail.com

ABSTRACT

*Human needs are unlimited, for fulling those we need money for which majority of people are engaged in 9 to 5 job but with the increased travel time to and fro from companies; the working time has become almost 10 to 11 hours leaving us with no time for anything else. Even if one earns crores but at the end of the day one needs food for survival and healthy food comes from your own kitchen for which we need to refill our kitchen pantry. Shopping is dreaded by many people as it consumes many hours in selecting products and standing in queue for billing. Hence, we are preparing this project to install all the gadgets required at bill counter in the shopping trolly itself. Thus, in the process of shopping; as one selects the product to buy and places it in the trolly, the scanner installed at the dashboard of trolly will scan it automatically and add up in the billing list. Thus, as one completes selection of products in trolly the billing is simultaneously been done at the same time; no extra time required for billing. This project. can be used in places like supermarkets, 24*7 convenience stores, pharmacy, cosmetic outlets and other shopping malls bring an automation in shopping from brick-and-mortar stores. The shopping malls architecture and interior designs have been at par with latest trends but still there is room for growth and betterment of customer service which we propose with this project idea. In today's market the sales graph is not only dependent on product and discount war but it is dependent on range of customer services offered. The e-commerce and traditional supermarkets are offering same products with almost same discounts plans. This project aims in increasing the sales graph exponentially as new and improved gadget to attract customer back to traditional brick and mortar stores. This project is user friendly and no special training is required to use this shopping trolly.*

Keywords: *Raspberry Pi, Barcode scanner, supermarket, e-commerce, customer service.*

Background of Invention

As an engineer we are supposed to give a scientific aid for people to survive from existing problems or invent something new people cannot live without (for ex:- whats app, online shopping platforms).

The e-commerce or online shopping platform didn`t existed a decade and half ago and now we cannot live without it in decades to come. As a result of which the offline, our traditional brick and mortar stores are facing revenue deficit due to exponential decline in sales because of dwindling customers. This project seeks to provide new electronic gadget to attract more crowd again to our traditional brick-mortar supermarkets.

Earlier in the end of nineteenth century, Supermarkets brought a revolution by introducing all under one roof concept and making available all alternate, substitute options of any product available at shelves of supermarkets. This project has the power to bring another revolution in field of shopping and supermarkets. The supermarkets were the only means for buying our daily necessities and grocery shopping. But with the advent of e-commerce the supermarkets are facing super losses and have become only emergency need store rather than the daily necessity shopping destination. This project is an business idea for revival of loss incurring; in debt supermarkets with the help of electronic technology.

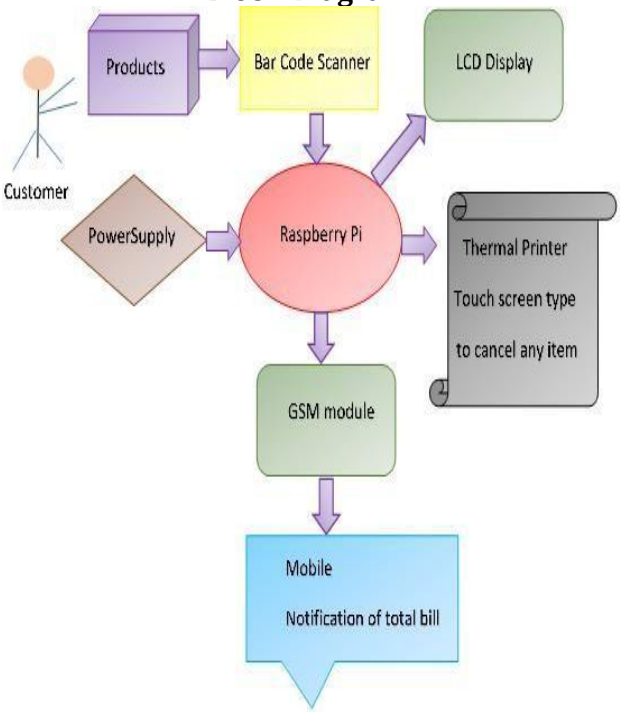
Objectives of Project

- State of art Technology to Bridge the gap between online platform and offline stores Automation in traditional shops thus making it at par with fast paced digital life.
- This technology works on our government plan towards cashless, contactless business plan. Consumers don`t have time to wait in long queue for billing even if they have to buy a single product
- Finding the technology viable, feasible, practical solution for the problems faced by the traditional retail shopkeepers.
- This project can fit into the existing system smooth as butter and yet give positive desired results of increasing sales which is much needed for supermarkets in order to survive in the online shopping festivals era.

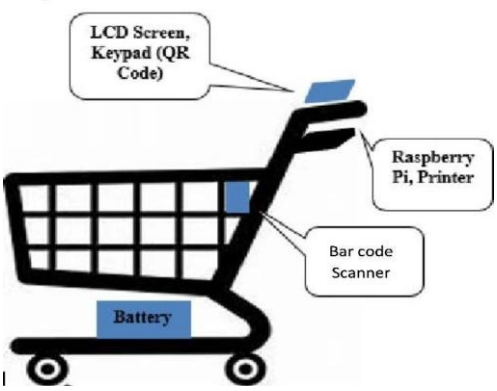
Thus, features of this project: -

- Bill calculation in the process of selection and insertion of products in trolly. No separate time for billing, thus saves precious time of customers.
- No queue No billing counter
- Less support staff.
- This system is profitable as it reduces the number of billing counter and thus saves cost of billing counter equipment's.

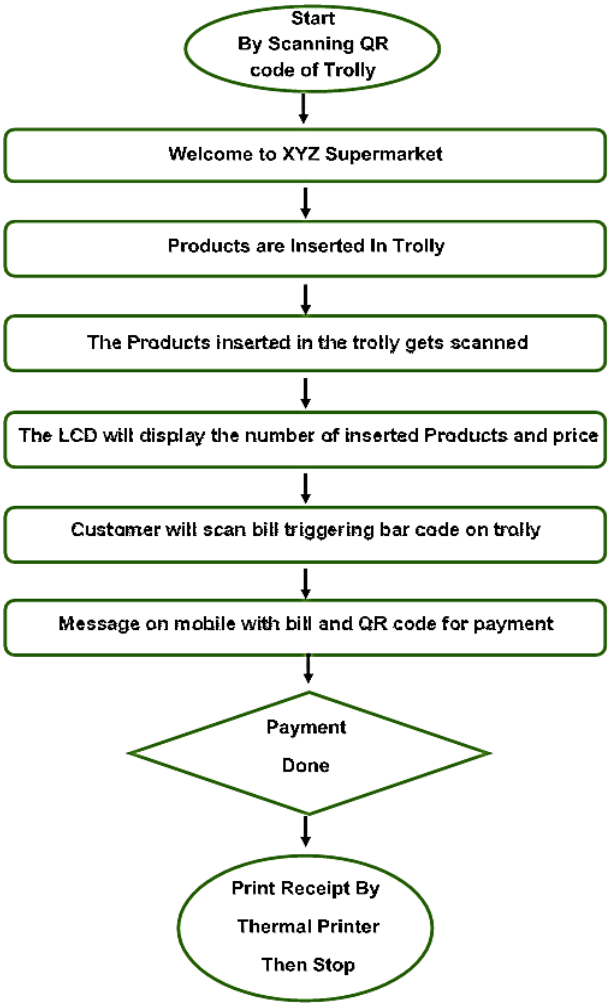
Block Diagram



System Design:



Flowchart



Working

Raspberry Pi is connected with the infrared bar code scanner. As the customer selects the items from shelves of supermarket and insert it in the trolly; the infrared bar code scanner will scan it and details of product will be displayed on LCD display on the trolly. All the products in the supermarket are given a unique bar code. This is already existing in all supermarkets hence our project can smoothly fit into the current system thereby reducing extra work for deployment of this project on field i.e. this project is easily adaptable to upgrade the current system of supermarkets. The LCD display will replace the computer screen on the billing counter. The LCD display the name & price of current product been scanned.

This process will continue till the trolly user continues to buy products in the supermarket. Once he is done with selecting and inserting all products in the shopping trolly; And if in case he wants to subtract certain products already

scanned; he may do so by deleting the certain item from the thermal printer touch screen. Then print the selected products total bill and make online payment using mobile by scanning the QR code printed on the bill. Thus, the customer saves time needed to stand in queue for billing or waiting for cash change.

A simple electronic trolly that has a bright future scope in artificial intelligence and robotic field development.

Conclusion

This project is a pilot model aimed to bridge the gap between traditional supermarket and e-commerce. The trolly with automatic billing system using infrared scanner quickly scans the product as inserted in trolly and touch screen printer will help to delete any unwanted scanned item; thus, the customer gains control over shopping and supermarket owner save money on salary of billing counter attendant due no billing counter, and no billing counter equipment cost.

References

1. J. D. Jadhav, Shital Gaddime, Kiran Hiware, Neeta Khadtsarer. , “A Fast and Smart Shopping Experience Using Android and Cloud.” International Journal of Innovative Research and Advanced Studies (IJIRAS) [2016]
2. Grewal, Dhruv; Roggeveen, Anne L.; Nordfält, Jens (March 2017). "The Future of Retailing". Journal of Retailing. The Future of Retailing. 93 (1): 1– 6. doi:10.1016/j.jretai.2016.12.008
3. N. Garun. (Dec. 12, 2016). Panasonic’s Smart Shopping BasketCalculates Your Bill
4. Day, Matt (January 21, 2018). "Amazon Go cashierless convenience store opening to the public". Seattle Times. Retrieved January 21, 2018. [https://superhii.com/Retailers-Starting-a-smart-shopping-trolley-business-plan- is-a-very-good-way-to-test-smart-shopping-cart-id3464988.html
5. P.T. Sivagurunathan P. Seema, M. Shalini, R. Sindhu, “Smart shopping trolley using RFID,” Volume 118 No. 20 2018, 3783-3786
6. International Journal of Applied Engineering Research ISSN 0973-4562 Volume 13, Number 23 (2018) pp. 16545-16547© Research India Publications.Development of Automatic Shopping Trolley in Supermarkets by Rajini.H, Assistant Professor; Reva University, Bengaluru,Karnataka, India.
7. www.ijcrt.org © 2018 IJCRT | Volume 6, Issue 2 April 2018 | ISSN: 2320-2882 IJCRTOXFO0013 International Journal of Creative Research Thoughts (IJCRT) www.ijcrt.org 67 A survey on Automated Shopping Trolley Follower for Super Market Billing System Poorvitha H R 1, Pavithra T N 2 , Sowbhagya T M2 , Savithramma K B2, and Yogesh Computer Science and Engineering Vivekananda Institute of Technology, Bangalore-74, Karnataka, India
8. Mekruksavanich, S. (2019). “The Smart Shopping Basket Based on IoT Applications.,”2019 IEEE 10th International Conference on Software Engineering and Service Science (ICSESS).
9. M. Jaishree., K. R. Lakshmi Prabha., S. Jeyaprabha. and K. Mohan., "Smart Shopping Trolley Using IOT,” 2021 7th International Conference on Advanced
10. Computing and Communication Systems (ICACCS), 2021, pp. 793-796, Doi: 10.1109/ICACCS51430.2021.9441786.

PLANT LEAF DISEASE DETECTION USING NEURAL NETWORK IN MACHINE LEARNING

Dr. J. S. Gawai [1]Chetna Paunikar[2], Shital Thul[3], Sangeet Ahirwar[4], Vaishnavi Wandhare[5]
Faculty[1], Students[2345] Department of Electronics Engineering, K.D.K College of Engineering[12345]
jyotsna12.gawai@gmail.com[1]

ABSTRACT

Farmers require automated monitoring of plant disease instead of human monitoring if they're going to maximize growth and output in their agricultural fields. Human eye observation is an antiquated approach that takes a great deal of time and needs an expert in order to correctly identify a sickness. Therefore, in this study, we developed a cutting-edge method for detecting leaf and fruit diseases simultaneously. In order to diagnose plant diseases quickly and accurately, we applied digital image processing to get beyond the limitations of the human sight. Our study proposes using a k-means clustering technique combined with a multi-SVM approach, both implemented in the MATLAB programme, to detect and categorise diseases.Because of a lack of readily available specialists, identifying plant diseases in certain countries may be a time-consuming and costly endeavour. Diseases spread on plants when they aren't checked often, necessitating the use of additional pesticides that are harmful to beneficial insects, birds, and other creatures. When the first signs of a disease occur on a plant's developing leaf or fruit, automatic detection is crucial for early diagnosis. In this research, we provide a MATLAB- based system for accurate disease detection and diagnosis in plants by analysing images of the affected areas of leaves and fruits.

Keywords: *Plant disease recognition, deep learning, computer vision, convolutional neural network*

I. Introduction

Rapid crop production relies on early identification of plant diseases. Crop yield and quality may both be diminished by plant diseases like black measles, black rot, bacterial spot, etc.. Farmers sometimes resort to costly strategies and the use of pesticides to lessen the effects of these illnesses. Chemical methods are destructive to both the plant and the ecosystem. Furthermore, the cost of
production rises and farmers suffer substantial financial losses under such a strategy. If you want to effectively manage a condition, you need to catch it early. In agriculture, it is common practise to rely on human expertise for the identification of plant diseases. Computer vision and artificial intelligence studies have advanced to the point that they can now automatically diagnose plant illnesses from raw photos. Researchers in this study were able to look at leaf-affecting plant illnesses and insect infestations.

These days, it's not uncommon to see a computer analysing images taken in a field, where they're used for anything from detecting weeds to grading fruit to counting the number of pests on a crop to studying the genetic makeup of plants. The widespread use of deep learning techniques is a hot topic right now. When it comes to artificial intelligence, the most cutting-edge technique is deep learning, which mimics the way the human brain learns. Semantic characteristics are often used in conventional approaches as a classification tool, In the realm of image processing, the deep learning model known as a convolutional neural network (CNN) has found a lot of use.When it comes to classifying the features that have been retrieved from leaves, the work of Lee et al. proposes a hybrid model that uses CNN to acquire characteristics of leaves. Data collection, data cleaning, and picture categorization are the three main components of the study's approach. Plant village dataset, which includes apple, maize, grape, potato, sugarcane, and tomato plant types, was used in the research. The research includes healthy photos of plants that have been detected with 11 different forms of plant illnesses. Image pre-processing entails downsizing and improving pictures before feeding them into a classification algorithm. Sustainable agriculture and the challenge of effective disease prevention go hand in hand.If pesticides are used incorrectly, diseases may develop long-term resistance and become more harder to combat. An important part of

precision agriculture is the rapid and precise identification of plant diseases.Correct and timely illness detection, including early prevention, has never been more vital than it is now in order to halt the loss of money and other resources and instead achieve healthy production in this shifting environment. The occurrence of plant diseases may be detected in a number of ways. In the absence of obvious signs or when it is too late to take preventative measures, it is essential to conduct a thorough and sophisticated examination. Diseases often express themselves subtly in the visible spectrum, hence a skilled professional's eye exam is the primary method used in practise for illness identification. Effective disease diagnosis requires keen observational abilities on the part of the plant pathologist, who must be able to pick out telltale signs of the disease. Inexperienced gardeners and hobbyists may have a harder time identifying the sick plant's symptoms than a trained plant pathologist would. In the gardening process, amateurs might benefit greatly from a fully automated system intended to help diagnose plant illnesses based on the plant's look and visual symptoms, and trained specialists could use such a system as a confirmation method in disease diagnosis [3]. Recent developments in computer vision provide a potential to increase the scope of comprehensive plant safety practices and broaden the market for computer vision applications in precision agriculture [4]. The purpose of this work was to identify and categorise plant illnesses by the use of standard digital image processing methods such as colour analysis and thresholding. ANN [5] is a paradigm in machine learning and research that takes its cues from the manner in which organic nervous systems, such as the brain, process information.

Neural networks, also known as connectionist systems, are a type of computational model used in computing and other research disciplines that is based on a large collection of neural units (artificial neurons) to solve problems in a fashion that is reminiscent of how the human brain solves problems using large clusters of biological neurons connected by axons. Each neuron is linked to a large network of others; these connections may be either reinforcing or inhibiting, depending on the nature of the neurons involved. Each neuron in the brain could have a summing function that averages out the numbers coming in. It's also possible that each link and the unit itself have some kind of function or limiting function that the signal must overcome in order to spread to neighboring neurons. Because they are self-learning and taught rather than explicitly coded, these systems thrive in situations when the response or feature detection is difficult to communicate in the context of a conventional computer virus. The signal route in neural networks normally goes from front to rear because they are multilayered or cubed. The term "back propagation" refers to the process of using forward stimulation to reset weights on the "front" neural units, and it is typically used in conjunction with training if the desired outcome is already known. The balance between stimulating and inhibiting connections in contemporary networks is a little more fluid. The most cutting-edge neural networks are dynamic ones, which may, under the guidance of rules, generate novel connections and even neuronal units while shutting down less useful ones. Although some neural networks are more abstract than others, their ultimate purpose is to solve

problems in the same manner as a human brain would. Even while modern neural network projects often use anywhere from a few thousand to a few million neural units and numerous connections, this is still several orders of magnitude less complicated than the human brain and closer to the computational capacity of a worm. Findings from cutting-edge neuroscience studies often inspire the emergence of novel neural network topologies. A recent development is the use of inter-neuron connections that are not limited to immediate neighbours but rather transcend many levels of processing. Axons convey a wide variety of signals throughout time, and some of the research being conducted on this topic involves techniques like Deep Learning, which interpolate more complexity than a simple on/off set of Boolean variables. The inputs may be any number between zero and one. Each input to the neuron is assigned a weight, and the neuron also has an overall bias. The inputs and their relative relevance to the output are

represented by the weights, which are actual values.

Image Preprocessing and Labelling

In order to improve the quality of the final image, it is common practise to do a series of pre- processing steps, such as removing low-recurrence foundation commotion, levelling the strength of the individual particles' images, removing reflections, and masking off sections of the image. Pre-processing images is a method of enhancing data quality. In addition, the pre-processing method included physically manipulating the seemingly endless number of photographs by drawing a square around the leaves to highlight the area of mystery (plant leaves). Photographs having a less ambitious aim and a measurement that isn't precisely 500 pixels were disregarded as significant throughout the time period of collecting the pictures for the dataset. Furthermore, only the images in which the area of interest was prominently shown were considered for inclusion in the data set. In this way, it was ensured that images include all the necessary information for highlight learning. While a thorough Internet search might turn up a wealth of information, evaluating its reliability isn't always straightforward. Horticultural experts looked at photos of leaves and labelled each one with an illness abbreviation because they were concerned about the accuracy of classifications in the dataset, which had been produced initially using a catchphrases search. For the training and validation dataset, it is crucial to choose well-characterized images. Only in this way is it possible to construct a reliable identification model. In this step, duplicate
images that remained in the dataset after the first focus on grouping and categorising images was removed.

Neural Network Training

To create a model for categorizing images, it was suggested to put up a deep convolutional neural network using a data set. In order to do mathematical calculations, the open-source library Tensor Flow makes use of data-flow diagrams. Numerical tasks are represented by the diagram's hubs, while the edges represent the shared multi-dimensional information displays (tensors). Using a single API, you may distribute computation over several CPUs or GPUs in a desktop, worker, or mobile device. Tensor Flow was developed by Google's scientists and designers working in the Google Brain Group as part of the company's Machine Intelligence research organization to advance the company's efforts in artificial intelligence (AI) and deep neural network (DNN) study, but the framework is sufficiently general to be relevant in a wide variety of other domains as well. For artificial intelligence, a convolutional neural network is a kind of feed-forward fake neural network inspired by the connection architecture of the animal visual brain. Individual neurons in the cortex only respond to changes in a small region of space called the responsive field. For the purpose of tiling the visual field, the response fields of distinct neurons only partially overlap. Using a convolution activity, one may estimate quantitatively the response of a single neuron to enhancements throughout its open field.

Convolutional networks, which were inspired by natural cycles, are a kind of multilayer perceptron designed to make minimal pre-handling adjustments. They find widespread use in fields like as visual recognition, recommendation systems, and everyday language instruction. There are several layers of active fields in convolutional neural networks (CNNs). These are small clusters of neurons that repeatedly display certain portions of the overall data. The outputs of these collections are then tiled so that their information districts overlap, yielding a more comprehensive representation of the original image; this process is repeated for each successive layer. The ability to tile helps CNNs maintain their own perspective on the news picture.

It is common for convolutional networks to include pooling layers, which combine the results from groups of neurons, to be either locally or globally. They, too, are built from several convolutional and fully connected layers, with point-wise nonlinearity added at the layers' conclusions.

Methodology

The majority of the population of India relies on farming for their livelihood. Many

problems, such as blemishes on the leaves, arise when farmers are farming crops. A diagnosis of the illness is necessary before preventative actions may be implemented. Currently, farmers and specialists rely on visual inspections of farms to identify leaf diseases in plants. When the land is too big, the high cost of labour is due to the need for a large number of workers to oversee the system and the constant monitoring of plants.As was previously indicated, visual surveillance of farms is both time-consuming and inaccurate. To get around this problem, image processing methods are used to detect leaf illnesses; however, there is currently no appropriate application to correctly categorise the leaf after its photos have been captured and its features have been recognised.There is a wide variety of leaf morphologies that may be used to categories plant diseases. Fuzzy logic, principal component analysis, and the K-Nearest Neighbor Classifier are just a few of the many categorization methods now in use.The leaves of 24 different plant species are used to create these labels, including apples, grapes, potatoes, and tomatoes. labelling of apples as either healthy, scabbed, rotten, or infected. Corn Cercospora label, must be specific Corn rust, corn health, corn blight, and grey spot [11], [13]. Black rot, Esca, healthy, and leaf blight are just few of the grape diseases that may be seen on the labels. Early blight, healthy, and late blight are the three types of potatoes labelled. Common diseases and pests that may be found on tomato plants are listed on the label.In all, there are 31,119 photos in the collection, and they are all either apples, maize, grapes, potatoes, or tomatoes. We utilise 24,000 different pictures. Each picture is reduced in size to 256 by 256 pixels, and then the training and testing datasets are split 80 percent to 20 percent. Next, the CNN model must be trained.

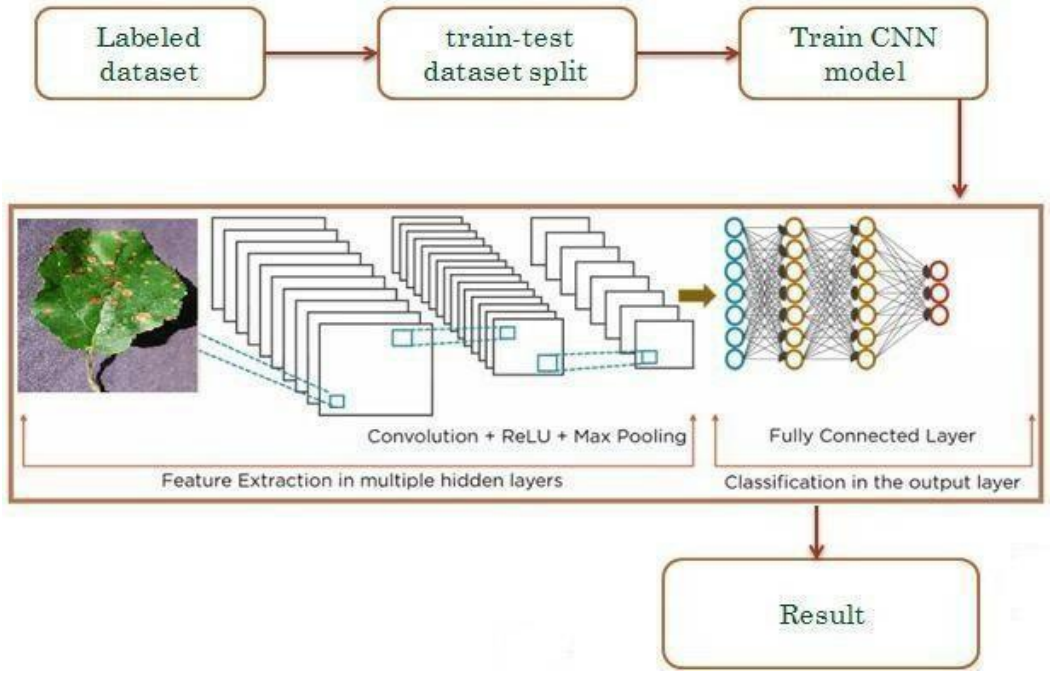


Fig 1 Proposed workflow of the overall system

Develop a convolutional neural network-based computer model that can accept as input a set of unlabeled photos and output labels that correspond to the content of those images (CNN).classification. They are a multi-layer neural network that, given enough training, can learn to identify the features used in classification. Autonomous feature extraction is performed with little involvement from humans, increasing efficiency over traditional approaches. The greatest results for detecting leaf diseases may be achieved by using a variation of the LeNet architecture.The layers of LeNet range from convolutional to

activation to max-pooling to completely connected. LeNet is simple in comparison to other CNN models. Using this methodology, the LeNet model classifies leaf diseases. To improve upon the capabilities of the original LeNet architecture, this version adds new convolution, activation, and pooling layers. The paper's model is shown in Figure 2. You'll find a convolution, activation, and max pooling layer in every unit. Three of these blocks are used in this architecture, with fully-linked layers and soft- max activation coming next. For classification, we use completely connected layers, whereas for feature extraction, we use convolution and pooling layers. When applied to a network, the activation layer reduces the network's linearity. The convolution process is used to extract features using the convolution layer. It's been my experience that as analysis becomes deeper, so does the intricacy of the retrieved traits. Whereas the size of the filter is fixed at a 5, the number of filters
utilised increases by a factor of 5 as we go from one block to the next. Twenty filters are utilised in the first convolutional block, fifty in the second, and eighty in the third. This increase in filters is necessary since the feature maps have become smaller because to the use of pooling layers inside each of the blocks. After the convolution process has been completed, the feature maps are zero padded to maintain the original image size. The max pooling layer is used to minimise the size of the feature maps, which both accelerates the training process and makes the model more robust to small changes in input. Maximum pooling uses a 22-bit kernel. Each block incorporates a Re-LU activation layer to introduce the necessary non-linearity. To avoid the train set being over-fit, we have additionally used Dropout regularisation with a maintenance probability of 0.5. Dropout regularisation is a technique that may be used to prevent overfitting by randomly eliminating neurons from the network during training. In the end, a fully-connected neural network with two layers of 500 neurons each is used for classification, followed by many layers of 10 neurons each. Using a soft max activation function, the probability scores for each of the 10 classes are determined after a second thick layer.

Image acquisition

Image acquisition approach obtaining an photo with the aid of camera from any real life scene. In these days's global, commonly used approach is shooting picture with the aid of using virtual camera. But different strategies can also be used. In this undertaking, pix are taken from plant village dataset via which the photos might be fetched and the set of rules will be educated and tested

Image preprocessing

With the use of pre-processing, the image quality may be improved before further processing or analysis. Shade space conversion, picture smoothing, and enhancement are all part of the package. By correcting for distortion, an amazing shot may be taken. Raising the contrast of a picture is one of the primary goals of image enhancement. Images are clipped in order to participate in a certain event. The process of smoothing out clear areas is often employed in photography.

Image Segmentation

The term "image segmentation" refers to the technique of breaking apart a picture into its constituent elements. To simplify things, there are three distinct types of image segmentation:1. Edge primarily based

2. Region based totally
3. Clustering primarily based

In this work image segmentation is finished based totally on clustering. Clustering divide the records in to precise quantity of agencies that are homogeneous. The segmentation system in based on diverse capabilities located within the photo. This might be coloration information, barriers or segment of an photograph.

Feature extraction

A major factor in accurately determining the site of an infection is the extraction of characteristics. A key part of feature extraction is reducing the time and energy spent characterising massive datasets. It's a way of analysing images in search of a relevant collection of features that may be used to

categorise and analyse large amounts of data. The input data is analysed to determine which statistics would best illustrate the skills to be extracted; this simplified example is then used in place of the complete, legitimate data on the capabilities of the desired activity. For the most part, describing an area involves counting the variety of textures present there. A leaf's texture is analysed by computing its Gray Level Co-incidence Matrix (GLCM).Texture orientated function extraction like evaluation, strength, homogeneity are calculated.

Disease classification

The characteristic dataset is where we store the results of the category phase's extraction and evaluation of the co-occurrence capabilities of the leaves' feature values. To do image categorization, a Support Vector Machine is used. Commonly used for classification and regression, support vector machines (SVMs) are a family of interconnected supervised learning techniques. The data are separated into sections for instruction and evaluation. The SVM is taught using 80% of the pictures, while the remaining 20% are used to investigate potential causes. SVM uses a database of trained images to assess the quality and performance of an input image. SVM's output consists of a diagnosis and a treatment recommendation for a given medical condition.

Conclusion

The cultivation of crops is one of the world's most essential industries because of the fundamental need of food it provides to people everywhere. The agriculture sector relies heavily on the timely diagnosis and treatment of such illnesses. The purpose of this article is to successfully implement a convolutional neural network capable of identifying unique plant species and illnesses. Tests using real-time photos for disease detection and recognition in plants may be performed using the trained model. In order to further equip the trained models for use in actual applications, it may be necessary to expand the current dataset to include new plant kinds and various plant diseases in future study. The performance and accuracy of other CNN designs may be tested using varying learning rates and optimizers.

References

1. A. Lakshmanarao; M. Raja Babu; T. Srinivasa Ravi Kiran, Plant Disease Prediction and classification using Deep Learning ConvNets 2021 International Conference on Artificial Intelligence and Machine Vision (AIMV) IEEE Xplore: 10 January 2022.
2. Pushkara Sharma; Pankaj Hans; Subhash Chand Gupta Classification Of Plant Leaf Diseases Using Machine Learning And Image Preprocessing Techniques 2020 10th International Conference on Cloud Computing, Data Science & Engineering (Confluence) IEEE Xplore: 09 April 2020.
3. Mingjing Pei; Min Kong; Maosheng Fu; Xiancun Zhou; Zusong Li; Jieru Xu Application research of plant leaf pests and diseases base on unsupervised learning 2022 3rd International Conference on Computer Vision, Image and Deep Learning & International Conference on Computer Engineering and Applications (CVIDL & ICCEA)
4. Vishakha A. Metre; Sudhir D. Sawarkar, Reviewing Important Aspects of Plant Leaf Disease Detection and Classification 2022 International Conference for Advancement in Technology (ICONAT) IEEE Xplore: 10 March 2022
5. Yafeng Zhao; Zhen Chen; Xuan Gao; Wenlong Song; Qiang Xiong Plant Disease Detection Using Generated Leaves Based on DoubleGAN IEEE/ACM Transactions on Computational Biology and Bioinformatics (Volume: 19, Issue: 3, 01 May-June 2022)
6. A. Lakshmanarao; N. Supriya; A. Arulmurugan; Plant Disease Prediction using Transfer Learning Techniques Plant Disease Prediction using Transfer Learning Techniques IEEE Xplore: 01 July 2022.
7. S. Arivazhagan, R. Newlin Shebiah S. Ananthi, S. Vishnu Varthini, “Detection of unhealthy region of plant leaves and classification of plant leaf diseases using texture features,” CIGR Journal, March 2013)IEEE Xplore: 18 July 2022
8. Prajwala TM, Alla Pranathi, Kandiraju Sai

Ashritha, Nagaratna B. Chittaragi, Shashidhar G. Koolagudi, "Tomato Leaf Disease Detection using Convolutional Neural Networks," Proceedings of 2018 Eleventh International Conference on Contemporary Computing (IC3), 2018

9. J. Han and C. Moraga, "The Influence of the Sigmoid Function Parameters on the Speed of Back propagation Learning," in Proceedings of the International Workshop on Artificial Neural Networks: From Natural to Artificial Neural Computation, Berlin, Heidelberg, Jun. 1995, pp. 195–201, Accessed: Apr. 13, 2020
10. J.Brownlee, "Introduction to the Python Deep Learning Library TensorFlow," Machine Learning Mastery, May 04, 2016. https://machinelearningmastery.com/introduction- python-deep-learning- library-tensorflow/ (accessed Apr. 21, 2020).
11. Jiang, Peng, Yuehan Chen, Bin Liu, Dongjian He, and Chunquan Liang. "Real-Time Detection of Apple Leaf Diseases Using Deep Learning Approach Based on Improved Convolutional Neural Networks." IEEE Access 7 (2019):59069-59080
12. H. Durmus, E. O. Gunes¸ and M. Kirci, Disease detection on the leaves of the tomato plants by using deep learning, In AgroGeoinformatics, IEEE 6th International Conference on, pp.1-5, 2017.
13. H. A. Atabay, Deep residual learning for tomato plant leaf disease identification, Journal of Theoretical & Applied Information Technology, vol. 95 no. 24 pp. 6800-6808, 2017.
14. D.P. Hughes, and M. Salathé, An open access repository of images on plant health to enable the development of mobile disease diagnostics, arXiv:1511.08060, 2015
15. V. Tumen, O. F. Soylemez and B. Ergen, Facial emotion recognition on a dataset using convolutional neural network, 2017 International Artificial Intelligence and Data Processing Symposium (IDAP), 2017.
16. A. Krizhevsky, I. Sutskever, and G. H. E. Hinton, ImageNet Classification with Deep Convolutional Neural Networks, in advances in Neural Information Processing Systems, 2012.